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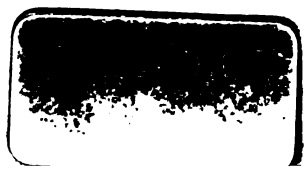

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ARMY MEDICAL DEPARTMENT

REPORT

FOR THE YEAR 1867.

VOLUME IX.

Presented to both Houses of Parliament by Command of Her Majesty.

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CONTENTS.

PAGE

Letter from the Director-General to the Secretary of State for War iii
Letter from the Heads of Branches to the Director-General v

REPORT.

I. On the Health of the Troops serving in the UNITED KINGDOM—
1. Sickness and Mortality 1
Admissions and Deaths by Classes of Diseases 2
„ „ at the different Groups of Stations .. 3
Remarks on the Prevalence of the principal Diseases at these .. 6
Prevalence of Venereal Diseases at each of the large Stations .. 7
Admissions, Deaths, and Invaliding from the different Arms of the Service 8
Deaths among the Soldiers placed upon the Pension List in 1867 .. 9
Admissions, Deaths, and Invaliding by Classes of Diseases in the different Arms 10
Remarks upon ditto 12
Admissions, Deaths, and Invaliding in each Corps 14
Re-Vaccination of Soldiers and Recruits 20
Aldershot Camp: Sanitary State of 21
Colchester „ ditto 22
Shorncliffe „ ditto 23
South-Eastern District, ditto 23
Chatham District, ditto 24
Woolwich Garrison, ditto 24
South-Western District, ditto 25
Netley, ditto 27
Devonport and Plymouth, ditto 28
Northern District, ditto 29
North Britain, ditto 29
Ireland: Dublin Division, ditto 30
„ Curragh Camp and Newbridge, ditto 31
„ Cork District, ditto 31
2. On the Extent of Invaliding 32
3. On the Number constantly Sick in Hospital 33
4. On the Influence of Age on the Mortality 33
5. On the Recruiting for the Army 34
Number of Recruits Inspected and Rejected 34
Proportion of Rejections in each of the Recruiting Districts .. 35
Native Countries of the Recruits inspected 36
Number inspected for each Arm of the Service 36
Causes of Rejection of Recruits found unfit 37
Age and Height of the Recruits 40
Weight of the Recruits inspected at Head-Quarters of Districts 41
Extent of Education of Recruits inspected at Head-Quarters of Districts, and at Regiments and Depôts 41
Previous Occupations of Recruits 41

II. On the Health of the Troops serving in the MEDITERRANEAN—
1. Sickness and Mortality 43
I. Gibraltar: Sickness and Mortality at 43
Admissions and Deaths by Classes of Diseases 44
Remarks on ditto 44
Sanitary state of the Command 45
II. Malta: Sickness and Mortality at 47
Admissions and Deaths by Classes of Diseases 48
Remarks on ditto 48
Prevalence of Fever 49
Outbreak of Cholera 49

PAGE

Royal Malta Fencible Artillery, Admissions and Deaths among, by Classes of Diseases 50
Sanitary state of the Command 52
2. On the extent of Invaliding among Troops serving in the Mediterranean 52
3. Mean Daily Sick of ditto 53
4. On the Influence of Age on the Mortality 54

III. On the Health of the Troops serving in BRITISH AMERICA—
1. Sickness and Mortality 55
I. Canada: Sickness and Mortality at 55
Admissions and Deaths by Classes of Diseases 56
Remarks on ditto 56
Sanitary state of the Command 57
II. Nova Scotia and New Brunswick: Sickness and Mortality in .. 58
Admissions and Deaths by Classes of Diseases 59
Remarks on ditto 59
Epidemic of Pneumonia 60
Sanitary state of the Command 60
III. Newfoundland: Sickness and Mortality in 61
Admissions and Deaths by Classes of Diseases 61
IV. Bermuda: Sickness and Mortality in 63
Admissions and Deaths by Classes of Diseases 63
Remarks on ditto 64
Sanitary state of the Command 65
2. On the extent of Invaliding among the Troops serving in British America 65
3. Mean Daily Sick.. 66
4. Influence of Age on the Mortality 67

IV. On the Health of the Troops serving in the WEST INDIES—
1. Sickness and Mortality 68
I. Windward and Leeward Command: Sickness and Mortality of White Troops 68
Admissions and Deaths by Classes of Diseases 69
Remarks on ditto 69
Admissions and Deaths at the Subordinate Stations 70
Sickness and Mortality of Black Troops 70
Remarks on ditto 71
Admissions and Deaths at the Subordinate Stations 73
Sanitary state of the Command 73
II. Jamaica: Sickness and Mortality of White Troops 75
Admissions and Deaths by Classes of Diseases 75
Remarks on ditto 75
Epidemic of Yellow Fever 76
Sickness and Mortality of Black Troops 77
Remarks on ditto 78
Sanitary state of the Command 79
III. Bahamas: Sickness and Mortality of Black Troops 80
IV. Honduras: ditto, ditto 82
2. On the extent of Invaliding among Troops serving in the West Indies and Western Africa 83
3. Mean Daily Sick 84
4. Influence of age on the Mortality 85

V. On the Health of the Troops serving in WESTERN AFRICA—
1. Admissions and Deaths by Classes of Diseases at Sierra Leone, the Gambia, and the Gold Coast and Lagos 86
Remarks on ditto 88
3. Mean Daily Sick 89

VI. On the Health of the Troops serving at ST. HELENA—
1. Sickness and Mortality 90
Admissions and Deaths by Classes of Diseases 91
Remarks on ditto 91
2. On the extent of Invaliding 92
3. Mean Daily Sick.. 92
Sanitary state of the Island 93

PAGE

VII. On the Health of the Troops serving at the CAPE OF GOOD HOPE—
1. Sickness and Mortality 94
Admissions and Deaths by Classes of Diseases 95
Remarks on ditto 95
Great prevalence of Venereal Diseases.. 96
Sanitary state of the Command.. 97
2. On the extent of Invaliding 97
3. Mean Daily Sick.. 98
4. Influence of Age on the Mortality 99

VIII. On the Health of the Troops serving in the MAURITIUS—
1. Sickness and Mortality 100
Admissions and Deaths by Classes of Diseases 101
Remarks on ditto 101
Epidemic of Malarious Fever 101
Sanitary state of the Command 103
2. On the extent of Invaliding 104
3. Mean Daily Sick.. 104
4. Influence of Age on the Mortality 105

IX. On the Health of the Troops serving in CEYLON—
1. Sickness and Mortality of the White Troops 106
Admissions and Deaths by Classes of Diseases 106
Remarks on ditto 107
Sickness and Mortality of Black Troops 107
Admissions and Deaths by Classes of Diseases 108
Remarks on ditto 108
2. On the extent of Invaliding 109
3. Mean Daily Sick.. 110
4. Influence of Age on the Mortality 110

X. On the Health of the Troops in the AUSTRALASIAN COLONIES—
1. Sickness and Mortality 111
I. Australia and Tasmania: Sickness and Mortality in 111
Admissions and Deaths by Classes of Diseases 111
Remarks on ditto 112
Sanitary state of the Command 112
II. New Zealand: Sickness and Mortality in 113
Admissions and Deaths by Classes of Diseases 114
Remarks on ditto 114
Sanitary state of the Command 115
2. On the extent of Invaliding 116
3. On the Mean Daily Sick 117
4. On the Influence of Age on the Mortality 117

XI. On the Health of the Troops serving in CHINA and JAPAN—
1. Sickness and Mortality 118
I. China, European Troops 118
Admissions and Deaths by Classes of Diseases 119
Remarks on ditto 119
Admissions and Deaths of Asiatic Troops 120
Remarks on ditto 121
Sanitary state of the Command 122
II. Japan, European Troops 123
Admissions and Deaths by Classes of Diseases 124
Remarks on ditto 124
Great prevalence of Venereal Diseases 125
2. On the Extent of Invaliding from China and Japan 126
3. Mean Daily Sick 126
4. Influence of Age on the Mortality 127

XII. On the Health of the European Troops serving in INDIA—
1. Sickness and Mortality 129
I. Bengal: Admissions and Deaths by Classes of Diseases .. 129
Remarks on ditto 130
Admissions and Deaths at each Station 132
Admissions and Deaths by Classes of Diseases in each of the Military Divisions 134

PAGE

Remarks on ditto 136
Epidemic of Cholera 139
Sickness and Mortality in each Corps serving in the Presidency 142
Sanitary state of the Command 148
II. Madras: Admissions and Deaths by Classes of Diseases .. 151
Remarks on ditto 151
Admissions and Deaths by Classes of Diseases at each Group of Stations 153
Remarks on ditto 153
Sickness and Mortality in each Corps serving in Madras .. 159
Sanitary state of the Command 161
III. Bombay: Admissions and Deaths by Classes of Diseases .. 167
Remarks on ditto 167
Admissions and Deaths by Classes of Diseases in each of the Military Divisions 170
Remarks on ditto 171
Epidemic of Cholera at Nusseerabad 173
Sickness and Mortality in each Corps serving in Bombay .. 175
Sanitary state of the Command 177
2. On the extent of Invaliding from India 178
3. Mean Daily Sick 180
4 Influence of Age on the Mortality 180
XIII. On the Health of Troops ON BOARD SHIP 182
1. Troops proceeding on Foreign Service 182
2. „ returning from ditto 183
3. „ passing from one Station to another 185
4. Invalids returning to England 186
XIV. Summary 186

APPENDIX.

No. I. Memorandum by the Army Sanitary Commission on Papers relating to Cholera in the North-West Provinces of India in 1867; and proposed Enquiry into the Causes of Cholera generally in that country .. 191
No. II. Dry Earth Conservancy, Madras 216
No. III. Memoranda for the Guidance of the Commission of Enquiry into the Origin and Progress of the recent Epidemic of Yellow Fever in Jamaica, especially with reference to its prevalence at Newcastle, 1867; with the Report of the Commission 224
No. IV. Report on Hygiene for 1868. By Dr. Parkes, F.R.S. 250
No. V. Result of an Experimental Investigation into the Ventilation of the New Barracks at Chelsea. By Staff Surgeon F. De Chaumont, M.D.. 265
No. VI. Medical History of the Abyssinian Expedition. By Inspector-General Currie, C.B... 277
No. VII. Miscellaneous Cases from the Clinical Records of the Medical Division, Royal Victoria Hospital, Netley. By Professor Maclean .. 300
No. VIII. Cases:—
Case of Aortic Aneurism. By Assistant-Surgeon Bredon, 97th Reg. 310
Case of Aneurism of the Arch of the Aorta. By Staff Surgeon Hyde 314
Case of Popliteal Aneurism cured by Compression. By Surgeon Porter, 97th Regiment 316
Case of Cerebro-Spinal Meningitis. By Surgeon Bartley, 54th Reg. 317
Two cases of Cerebro-Spinal Meningitis. By Assistant-Surgeon James Wilson 319
Two cases of Delirium Tremens. By Staff Assistant-Surgeon Dr. J. A. Shaw 320
Case of Sudden Death from Myocarditis. By Surgeon Hanbury .. 323
Case of Erysipelas, with Remarks. By Assistant-Surgeon Boileau, M.D., 29th Regiment.. 324
Case of Thoracic Aneurism, in which the Patient lived for fifteen days after its Rupture. By Dr. Boileau 325
No. IX. Remarks on Pneumonia. By Assistant-Surgeon Welch, 22nd Reg. 329
No. X. Transport of Troops and Invalids in India. By Inspector-General Beatson, C.B. 344
No. XI. Improvements suggested in the Equipment of H.M.'s British Hospitals in India. By Inspector-General Beatson, C.B... 351

PAGE

No. XII. Constitution of Army Hospital Corps (Native) for service in H.M.'s British Hospitals in India. By Inspector-General Beatson, C.B. .. 365
No. XIII. Female Nursing in, and Nurses for, Military Hospitals in India. By Inspector-General Beatson, C.B. 371
No. XIV. On Physical Indications of Age from 17 to 25 years. By Professor Aitken 374
No. XV. Report on the Epidemic of Fever in Cape Town, 1867. By Staff Surgeon-Major Thornton 381
No. XVI. Medical History of Sierra Leone. By Staff Surgeon Gore, M.D.. 404
No. XVII. The Russian Camp at Krasnoe Selo compared with the Camp at Chalons. By Dr. O. Heyfelder 417
No. XVIII. On the Comparative Use of certain Drugs in the Army at Home 432
No. XIX. Army Medical School, Netley; and the Alexander Memorial .. 434
No. XX. Circulars, General Orders, &c.:—
1. War Office Circulars:—
Treatment of Pensioners in Military Hospitals 444
Disinfectants 444
Medical examination of Men on Re-engagement 444
Hospital treatment for Women and Children 445
Travelling expenses of Officers relieving others proceeding on Leave 445
Medical Comforts 445
Supplies of Lime 445
Disinfectants at Isolated Stations 446
Distribution of Army Circulars 446
2. General Orders:—
Promotions 446
Hospital Establishments 447
Medical Officers' Dress 447
3. Departmental Circulars:—
On Revaccination 447
Nomenclature of Diseases 447
Undue expenditure of Medicines, &c. 448
Annual Return of Venereal Diseases 448
Medical Treatment of Soldiers 449
No. XXI. Statistical Abstracts:—
1. Abstract showing the Admissions into Hospital, Deaths, and Invaliding among the Troops in the UNITED KINGDOM in 1867 .. 450
2. Abstract showing the Number of Men belonging to the Regiments serving at home who were Vaccinated during the year 1867 .. 460
3. Abstract showing the Ages of the Men serving in the different Arms at Home, and the Deaths at each Age in 1867 461
4. Abstract showing the Number of Recruits inspected, and the Number found unfit for Service in each of the Recruiting Districts during the year 1867 462
5. Abstract showing the Native Country of the Recruits inspected at the Head-Quarters of each of the Districts during the year 1867.. 462
6. Abstract showing the Ages of the Recruits inspected in 1867 .. 463
7. Abstract showing the Heights of the Recruits inspected in 1867 .. 463
8. Abstract showing the Weights of the Recruits inspected in 1867 at the Head-Quarters of the Recruiting Districts 464
9. Abstract showing the State of Education of the Recruits inspected at the Head-Quarters of the Recruiting Districts, and at Regiments and Depôts in 1867 464
10. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving in the MEDITERRANEAN.. 465
11. Abstract showing the Diseases of the Men sent Home as Invalids from the Mediterranean, and of those finally discharged the Service.. 470
12. Abstract showing the Ages of the Troops in the Mediterranean, and the Deaths at each Age 472
13. Abstract showing the Admissions into Hospital, and Deaths among the Troops serving in BRITISH AMERICA 473
14. Abstract showing the Diseases of the Men sent Home as Invalids from British America, and of Men discharged the Service as Invalids in British America, and at Netley.. 478

United Kingdom.

Orders.	Average Strength, 73,420.	Admitted into Hospital	Died.			Ratio per 1,000 of Mean Strength.			
						1867.		1860–6.	
			With the Regiment.	Absent from the Regiment.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	11,414	75	3	78	155·5	1·06	201·8	1·09
2	Enthetic „ ..	21,399	4	..	4	291·5	·06	317·1	·12
3	Dietic „ ..	825	5	..	5	11·2	·07	7·8	·07
4	Parasitic „ ..	2,936	..	..	..	40·0	..	38·5	..
	Class II.								
1	Diathetic Diseases ..	340	6	2	8	4·6	·11	3·3	·14
2	Tubercular „ ..	960	213	27	240	13·1	3·27	17·7	3·15
	Class III. Diseases of the—								
1	Nervous System ..	1,357	48	2	50	18·5	·68	19·2	·72
2	Circulatory „ ..	589	96	6	102	8·0	1·39	9·0	·95
3	Respiratory „ ..	5,353	70	6	76	72·9	1·04	90·5	1·35
4	Digestive „ ..	2,485	39	2	41	33·8	·56	37·4	·54
5	Urinary „ ..	219	15	..	15	3·0	·20	2·9	·16
6	Reproductive „ ..	804	..	..	..	11·0	..	10·1	..
7	Locomotive „ ..	345	2	..	2	4·7	·03	4·0	·02
8	Integumentary „ ..	8,272	1	..	1	114·0	·01	126·9	·05
	Class IV.								
4	Diseases of Nutrition..	177	1	..	1	2·4	·01	2·2	·03
	Class V.								
1	Accidents	6,261	36	3	39	85·3	·53	83·8	·63
3	Homicide	1	2	..	2	·2	·03	·2	·31
4	Suicide..	12	23	2	25		·34		
5	Execution	..	..	..	..	..	..	..	·01
6	Corporal Punishment..	39	..	..	..	·5	..	2·0	..
	No Appreciable Disease	16	..	..	..	·2	..	1·3	..
	Cause unknown ..	..	1	..	1	..	·01	..	..
	Total ..	63,904	637	53	690	870·4	9·40	975·7	9·34

The admissions by miasmatic diseases have been considerably under the average; diseases of the respiratory and integumentary systems and venereal diseases have also been less prevalent, though not in so marked a degree.

Compared with the results for 1866 there has been an increase of 17 per 1,000 in the admissions. This has been due to the greater prevalence of venereal diseases, which have been 33 per 1,000 in excess of the preceding year. The increase from this cause has been partly counterbalanced by a decrease in miasmatic diseases and those of the respiratory system.

On subdividing the admissions and deaths, as in former Reports, according to the stations at which they occurred, the following results are obtained:—

United Kingdom.

	Average Strength.	Admitted into Hospital.	Died.	Average constantly Sick.
1. Seaport Towns	9,142	8,894	100	464
2. Dockyards and Arsenals	10,341	8,589	80	434
3. Camps	16,819	14,695	121	711
4. Large Manufacturing Towns ..	3,058	3,089	35	146
5. London and Windsor	5,454	4,242	42	239
6. Dublin	5,374	4,614	64	249
7. Stations of Depôt Battalions not included in preceding groups..	6,967	7,423	62	327
8. Remaining Stations	16,265	12,358	133	548
9. Detached from their Corps ..	..	..	53	..
Total ..	73,420	63,904	690	3,118

The following Table shows the proportion per 1,000 of mean strength, calculated from these numbers, contrasted with the results for the preceding seven years :—

	Ratio per 1,000 of Strength.					
	1867.			1860–66.		
	Admitted into Hospital.	Died.	Constantly Sick.	Admitted into Hospital.	Died.	Constantly Sick.
1. Seaport Towns	973	10·94	50·75	1,005	8·99	53·73
2. Dockyards and Arsenals ..	831	7·74	41·97	1,101	9·77	56·31
3. Camps	874	7·19	42·27	920	6·58	48·60
4. Large Manufacturing Towns	1,010	11·44	47·74	1,053	8·33	48·94
5. London and Windsor	778	7·70	43·82	884	7·87	51·38
6. Dublin	859	11·91	46·33	958	8·35	54·21
7. Stations of Depôt Battalions not included in preceding groups	1,065	8·89	46·94	1,038	8·82	50·84
8. Remaining Stations ..	760	8·17	33·69	893	7·31	39·75
Total, including men detached from their Corps	870	9·40	42·47	976	9·34	50·09

The admissions into hospital have been under the average of the seven preceding years in all the groups except the stations of Depôt Battalions, where they have been slightly in excess of it, and the proportion constantly sick has been below the average in all. It has been different, however, with the mortality, which has exceeded the average in all the groups except the Dockyards and Arsenals, and London and Windsor.

Compared with the results for 1866, there has been an increase in the admissions at the Seaport Towns, Camps, Manufacturing Towns, Stations of Depôt Battalions, and the "Remaining Stations"; in the deaths at the Seaport Towns, Manufacturing Towns, London and Windsor, Dublin, and the Stations of Depôt Battalions; and in the mean daily sick at the Seaports, Manufacturing Towns, Depôt Battalions, and "Remaining Stations."

The following Table shows the influence of the different classes of diseases in causing sickness and mortality at each group of stations :—

Orders.	Groups of Stations ..	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.		Men detached from their Corps.
	Average Strength ..	9,142		10,341		16,819		3,058		5,454		5,374		6,967		16,265		
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
	Class I.																	
1	Miasmatic Diseases ..	1,453	7	1,696	9	2,385	15	424	1	743	3	772	19	1,531	5	2,410	16	3
2	Enthetic „ ..	3,227	1	2,639	..	4,908	1	1,268	1	1,537	..	1,793	..	2,412	..	3,615	1	..
3	Dietic „ ..	145	2	130	..	180	..	21	..	42	..	40	..	62	1	205	2	..
4	Parasitic „ ..	402	..	462	..	790	..	156	..	122	..	148	..	352	..	504	..	..
	Class II.																	
1	Diathetic Diseases ..	48	2	50	..	67	2	16	..	41	..	23	..	43	..	52	2	2
2	Tubercular „ ..	125	31	153	33	176	35	51	18	88	19	63	17	90	24	214	36	27
	Class III.																	
	Diseases of the—																	
1	Nervous System ..	224	10	192	7	308	9	45	2	59	1	76	2	133	5	320	12	2
2	Circulatory „ ..	84	15	83	12	120	20	28	3	36	9	47	10	61	9	130	18	6
3	Respiratory „ ..	718	11	752	5	1,194	16	339	5	380	2	441	7	451	10	1,078	14	6
4	Digestive „ ..	355	6	332	7	542	7	85	..	212	2	226	1	249	3	484	13	2
5	Urinary „ ..	34	3	31	2	45	3	8	1	10	1	17	3	40	..	34	2	..
6	Reproductive „ ..	104	..	86	..	185	..	48	..	47	..	54	..	87	..	193	..	..
7	Locomotive „ ..	48	1	42	1	113	..	18	..	19	..	21	..	35	..	49	..	..
8	Integumentary „ ..	1,115	..	1,088	..	2,072	..	321	..	506	..	557	..	1,126	..	1,587	1	..
	Class IV.																	
4	Diseases of Nutrition ..	35	..	15	..	49	..	13	1	8	..	7	..	25	..	25	..	..
	Class V.																	
1	Accidents	767	5	833	3	1,543	8	245	1	387	2	322	2	722	3	1,442	12	3
3	Homicide	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..
4	Suicide	2	6	1	..	1	5	2	2	..	2	..	3	3	1	3	4	2
6	Corporal Punishment ..	6	..	3	..	14	..	..	..	..	..	6	..	..	..	10	..	..
	No appreciable disease..	2	..	1	..	3	..	1	..	5	..	1	..	1	..	2	..	..
	Cause unknown ..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	8,894	100	8,589	80	14,695	121	3,089	35	4,243	42	4,614	64	7,423	62	12,358	133	53
	Average constantly Sick	464	..	434	..	711	..	146	..	239	..	249	..	327	..	548	..	..

RATIO per 1,000 of MEAN STRENGTH.

Orders.	Groups of Stations ..	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																
1	Miasmatic Diseases ..	158·9	·76	164·0	·87	141·8	·89	138·6	·33	136·2	·55	143·7	3·54	219·8	·72	148·1	·98
2	Enthetic „ ..	353·0	·11	255·2	..	291·8	·06	414·7	·33	281·8	..	333·6	..	346·2	..	222·3	·06
3	Dietic „ ..	15·9	·22	12·6	..	10·7	..	6·9	..	7·7	..	7·4	..	8·9	·14	12·6	·12
4	Parasitic „ ..	44·0	..	44·7	..	47·0	..	51·0	..	22·4	..	27·5	..	50·5	..	31·0	..
	Class II.																
1	Diathetic Diseases ..	5·2	·22	4·8	..	4·0	·12	5·2	..	7·5	..	4·3	..	6·2	..	3·2	·12
2	Tubercular „ ..	13·7	3·39	14·8	3·19	10·5	2·08	16·7	5·88	16·1	3·48	11·7	3·16	12·9	3·44	13·1	2·21
	Class III.																
	Diseases of the—																
1	Nervous System ..	24·5	1·09	18·6	·68	18·3	·53	14·7	·65	10·8	·18	14·1	·37	19·1	·72	19·7	·74
2	Circulatory „ ..	9·2	1·64	8·0	1·16	7·1	1·19	9·2	·98	6·6	1·65	8·8	1·86	8·8	1·29	8·0	1·11
3	Respiratory „ ..	78·5	1·20	72·7	·48	71·0	·95	110·9	1·63	69·7	·37	82·1	1·30	64·7	1·44	66·3	·86
4	Digestive „ ..	38·8	·66	32·1	·68	32·2	·42	27·8	..	38·9	·37	42·1	·19	35·7	·43	29·8	·80
5	Urinary „ ..	3·7	·33	3·0	·19	2·7	·18	2·6	·33	1·8	·18	3·2	·56	5·8	..	2·1	·12
6	Reproductive „ ..	11·4	..	8·3	..	11·0	..	15·7	..	8·6	..	10·0	..	12·5	..	11·9	..
7	Locomotive „ ..	5·2	·11	4·1	·10	6·7	..	5·9	..	3·5	..	3·9	..	5·0	..	3·0	..
8	Integumentary „ ..	122·0	..	105·2	..	123·2	..	105·0	..	92·8	..	103·7	..	161·6	..	97·6	·06
	Class IV.																
4	Diseases of Nutrition ..	3·8	..	1·4	..	2·9	..	4·2	·33	1·5	..	1·3	..	3·6	..	1·5	..
	Class V.																
1	Accidents	83·9	·55	80·6	·29	91·7	·47	80·1	·33	71·0	·37	59·9	·37	103·6	·43	88·6	·74
3	Homicide	..	..	..	..	..	..	..	..	..	·18	..	..	..	·14	·1	..
4	Suicide	·2	·66	·1	..	·1	·30	·6	·65	..	·37	..	·56	·4	·14	·2	·25
6	Corporal Punishment ..	·7	..	·3	..	·8	..	..	..	..	..	1·1	..	..	..	·6	..
	No appreciable disease	·2	..	·1	..	·2	..	·3	..	·9	..	2	..	·1	..	·1	..
	Cause unknown ..	..	..	..	·10	..	..	..	..	..	..	..	..	..	..	..	..
	Total	972·8	10·94	830·6	7·74	873·7	7·19	1010·1	11·44	777·8	7·70	858·6	11·91	1065·4	8·89	759·8	8·17

United Kingdom. MISASMATIC DISEASES occasioned a lower rate of admissions into hospital than in 1866 in all the groups except the "Remaining Stations," and the excess in them was trifling; the mortality also was lower except in Dublin, where there was a marked increase. The influence of the principal diseases of this class in causing sickness and mortality are shown in the following Table:—

		Annual Ratio per 1,000 of Mean Strength.							
		Seaport Towns.	Dockyards and Arsenals.	Camps.	Manufacturing Towns.	London and Windsor.	Dublin.	Depôt Battalion Stations.	Remaining Stations.
Eruptive Fevers ..	Admitted	2·2	5·1	2·0	3·3	2·5	2·0	2·6	1·5
	Died ..	·11	·19	..	..	..	..	..	..
Paroxysmal Fevers ..	Admitted	15·6	17·5	6·2	2·3	..	3·2	6·7	9·7
	Died ..	..	·19	..	..	..	..	..	·06
Continued Fevers ..	Admitted	11·9	16·0	11·8	11·1	16·7	21·4	18·1	16·5
	Died ..	·32	·29	·59	..	·55	2·97	·14	·74
Dysentery & Diarrhœa	Admitted	17·1	19·5	19·5	10·5	17·6	10·2	16·8	14·1
	Died ..	·22	·19	·18	..	..	·19	·14	..
Spasmodic Cholera	Admitted	·2	..	..	..	..	..	..	..
	Died ..	..	..	..	..	..	..	..	..
Sorethroat and Influenza	Admitted	41·3	42·7	35·1	36·0	47·8	42·8	89·6	36·3
	Died ..	..	..	..	..	..	..	..	..
Ophthalmia	Admitted	17·9	10·9	15·9	17·6	6·8	13·9	15·2	18·4
	Died ..	..	..	..	..	..	..	..	..
Rheumatism	Admitted	40·3	39·0	42·6	45·4	31·2	40·0	47·8	37·8
	Died ..	..	..	..	·33	..	·19	..	..

Eruptive Fevers were more prevalent than in 1866 at the Dockyards and Arsenals, chiefly from the occurrence of 17 cases of small-pox at Woolwich, and of a number of cases of scarlet fever at Woolwich and Sheerness.

Continued Fevers show a marked decrease compared with the results for 1866 at the Seaports, the Manufacturing Towns, and London and Windsor; but a considerable increase in Dublin, and in the Dockyards and Arsenals, chiefly at Woolwich. The mortality by this form of fever among the troops in Dublin was five times as high as in 1866. This was due to the occurrence of a number of cases of cerebro-spinal meningitis attended with purple blotches, and which were returned under the head of purpuric fever, malignant typhus, or cerebro-spinal meningitis. They have all been grouped in the preceding Tables under typhus. A detailed report of the progress of this disease at Dublin and other stations, will be found at p. 426 of the Army Medical Report for 1866 (vol. viii., Appendix XLV.)

Dysentery and Diarrhœa were not half as prevalent as in 1866 in the Manufacturing Towns, London and Windsor, and Dublin, and there was also a considerable reduction at the Dockyards and Arsenals, but in that year the proportion had been considerably above the average.

Spasmodic Cholera did not prevail as an epidemic during the year. Two sporadic cases were reported among the troops at Devonport, but neither of them proved fatal.

Influenza and Sorethroat (Tonsillitis) were greatly in excess of the average at the Stations of the Depôt Battalions. This was chiefly due to their prevalence at Warley and Preston; at the former the admissions by them amounted to upwards of 16 per cent., and at the latter to 13½ per cent. of the strength. Influenza appears to have been epidemic at these two stations during the first quarter of the year, and also, though not in so marked a

degree, at Portsmouth, London, Aldershot, and Athlone; it was very prevalent also in the last quarter at Woolwich, Dublin, and Aldershot. *United Kingdom*

Enthetic Diseases were more prevalent than in 1866 at all the groups of stations, but particularly in the large Manufacturing Towns, and, next to these, at the stations of the Depôt Battalions. Their prevalence at each of the stations, where considerable numbers of men have been quartered, is shown in the following Table:—

	Ratio per 1,000 of Mean Strength.			Ratio per 1,000 of Mean Strength.	
	1867.	1866.		1867.	1866.
Manchester	501	312	Chatham and Sheerness	277	326
Colchester	500	451	Limerick	272	150
Portsmouth and Gosport	378	359	Aldershot	261	233
Canterbury	375	379	Woolwich	255	219
Preston	361	272	Edinburgh	244	171
Dover	354	248	Belfast	230	215
Dublin	333	323	Shorncliffe	215	219
Warley	328	328	Fermoy	202	149
Isle of Wight	327	254	Cork	196	160
Devonport and Plymouth	312	317	Pembroke Dock ..	153	100
Winchester	288	287	London and Windsor { Household Cavalry ..	129	143
Curragh	280	217	London and Windsor { Foot Guards	326	311

This Table shows the admissions by venereal diseases to have been greater than in 1866 at all the large stations except Warley, where the proportion in the two years was identical, Canterbury, Winchester, Devonport and Plymouth, and Shorncliffe, where there was a very slight reduction, and Chatham and Sheerness, where the ratio of admissions in 1867 was 49 per 1,000 of the strength lower than in the preceding year. The increase was most marked at Manchester, Preston, Dover, the Isle of Wight, Edinburgh, and Limerick. The Contagious Diseases Act of 1866 was in operation during the whole year at Devonport and Plymouth, Portsmouth and Gosport, Chatham and Sheerness, and Woolwich, and for eight months and a half at Aldershot; but the results do not seem as yet to have realized the expectations which were entertained of its effects in reducing the amount of these diseases among the troops, except at Chatham and Sheerness.

The following Table shows the relative amount of syphilitic and gonorrhœal diseases, comprised in the general class of venereal, with the loss of service caused by each group respectively:—

1867.	Admissions into Hospital.	Average constantly Sick.	Ratio per 1,000		Loss of Service to whole Force.	Duration of Cases in Hospital.
			Admitted.	Constantly Sick.		
					Days.	Days.
Syphilitic group ..	11,293	818	153·8	11·14	4·06	26·44
Gonorrhœal group .	10,106	440	137·7	5·99	2·19	15·89

On comparing this with the corresponding Table for 1866, there will be found an increase in the proportion of admissions into hospital, constantly sick, and loss of service by both groups, but rather greater in the gonorrhœal than the syphilitic, and a decrease in the duration of the cases under treatment amounting to 1·69 days in the syphilitic, and ·79 days in the gonorrhœal group.

Tubercular Diseases.—The admissions by this class of diseases have been ower in all the groups of stations than in 1866, but this improvement has not

United Kingdom.

extended to the deaths, of which the ratio has been higher in all except the Dockyards and Arsenals, where it had been exceptionally high in that year. Taken on the aggregate of the groups the mortality by these diseases has been higher than in any year since 1862, and has exceeded the ratio in 1866 by ·30 per 1,000 of the strength.

Diseases of the Respiratory System were greatly in excess of the average and of the proportion in 1866 in the large Manufacturing Towns. The excess occurred chiefly in cases of bronchitis at Manchester, Belfast, and Birmingham, during the first quarter of the year.

Accidental and Violent Deaths.—The proportion of deaths in this class closely approximated that of 1866; those by drowning, however, were only in the proportion of 17 to 25, and, as in that year, one of them was suicidal. There were 25 deaths by suicide—of these 13 were by fire-arms, 6 by cut-throat, 3 by poison, 2 by hanging, and 1 by drowning.

Among the admissions from accidental injuries were three from the bites respectively of a tiger, a bear, and a monkey. The first occurred in a travelling menagerie at Aldershot, where a soldier of the 4th Dragoon Guards lost the tips of two fingers; the second was a trifling injury to the hand of a man of the 17th Lancers, received "while playing with the regimental bear"; and the third was received at the Zoological Gardens, Dublin, and was followed by inflammation and abscesses for which the man was under treatment for thirty days.

In submitting the usual information respecting the sickness and mortality by arms of the service, it may be scarcely necessary to observe that only those corps are included in the Tables which were serving at home during the whole year. We are enabled for the first time to include the mortality of two special corps—the Army Hospital and Commissariat Staff Corps. These, like the Royal Engineers, are so much detached that it is impossible to give accurate details of the sickness occurring among them.

The following Table shows the amount of the admissions into hospital, deaths, and discharges by invaliding in each arm of the service, during the year:—

	Average Strength.	Admitted into Hospital.	Died in and out of Hospital.	Discharged as Invalids.	Annual Ratio per 1,000 of Strength.			1859-66. Annual Ratio per 1,000.		1860-6 Ratio per 1,000.
					Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Household Cavalry	1,226	698	10	17	569	8·16	13·85	613	7·40	14·79
Dragoon Guards & Dragoons ..	7,710	5,702	49	195	740	6·36	25·29	915	6·46	30·51
Royal Artillery ..	7,811	6,432	50	200	823	6·40	25·60	1,017	7·57	*
Royal Engineers..	2,627	..	12	21	..	4·56	7·99	..	6·99	..
Military Train ..	1,321	1,193	7	17	903	5·30	12·88	1,019	6·72	25·83
Foot Guards ..	5,529	4,126	38	117	746	6·87	21·16	838	8·63	30·44
Infantry Regts. ..	20,644	16,149	179	496	782	8·67	24·03	838	7·87	29·81
Army Hosp. Corps	697	..	11	2	..	15·78	2·86	..	..	..
Commist. Staff „	380	..	5	8	..	13·16	21·05	..	..	..
Depôt Brig., R.A..	3,011	3,324	28	36	1,104	9·30	11·96	1,112	10·65	26·71
Coast Brig., R.A..	1,743	..	26	12	..	14·91	6·88	..	19·13	..
Depôt Battalions.	15,649	13,442	180	474	859	11·50	30·29	1,007	11·61	42·49

Compared with 1866, these ratios show a reduction in the admissions into

* Prior to 1864 it was found impossible to separate the invalids of the Brigades serving at home from those of the Depôt Brigades. The ratio discharged as invalids in 1867, calculated in the same manner as for the preceding years, would be 21·81 per 1,000 of the strength.

hospital in the Household Cavalry and Royal Artillery, but an increase in all the other arms. The mortality has been lower in all the arms except the Foot Guards, in which it has been identical in the two years, and the Household Cavalry, Infantry Regiments, and Depôt Battalions, in which there has been an increase. The invaliding has been under the ratio of 1866 in all the arms. *United Kingdom.*

The admissions and invaliding have been below the average of the preceding eight years in all the arms, and the deaths in all except the Household Cavalry and the Infantry Regiments, in which the average has been slightly exceeded. The mortality in the two Departmental Corps has been high, but the numbers serving in them are so small that a considerable range may be naturally expected.

On adding to the strength in the preceding Table half the number of men placed on the pension list during the year from each of the corps included, and the total deaths which occurred among these men between the date of their discharge and the 31st of December, in accordance with the principles explained in former Reports, the following results are obtained :—

	1867.			1860–66.
	Average Strength corrected as above.	Deaths of Soldiers and Pensioners.	Ratio of Deaths per 1,000 of Strength.	Ratio of Deaths of Soldiers and Pensioners per 1,000 of Strength.
Household Cavalry	1,252	11	8·79	8·89
Cavalry of the Line	7,840	67	8·55	7·30
Royal Artillery	7,933	59	7·44	8·24
Military Train	1,335	8	5·99	7·41
Foot Guards	5,614	52	9·26	11·05
Infantry Regiments	21,078	212	10·06	9·22

With this addition to the mortality of the different arms the ratio has been highest in the Infantry Regiments, and next to them in the Foot Guards. It has been above the average of the preceding seven years in the Cavalry of the Line and the Infantry Regiments, but lower in all the other arms. It is perhaps scarcely necessary to observe that the strength and deaths added to the preceding Table are those only of men pensioned from the different corps, without reference to the cause of discharge being length of service or disability, and do not include any men discharged the Service without pension, as there are no means of subsequently tracing them.

The admissions into hospital, and deaths by the different classes of diseases in each arm of the Service, are shown in the following Table, framed from Abstract No. 1, in Appendix :—

United Kingdom.

Orders.	Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry Regiments.			Depôt Brigade Royal Artillery.			Infantry Depôt Battalions.			Royal Engineers.	Coast Brigade, R. A.		Army Hospital Corps.		Commissariat Staff Corps.	
	Strength	1,226			7,710			7,811			1,321			5,529			20,644			3,011			15,649			2,627	1,743		697		380	
		Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Died.	Died.	Invalided.	Died.	Invalided.	Died.	Invalided.
	Class I.																															
1	Miasmatic Diseases ..	131	1	2	993	7	15	1,091	7	21	211	..	1	691	4	2	2,863	23	56	848	2	..	2,849	18	37	2	1	3	..	..	..	..
2	Enthetic „ ..	157	..	..	1,636	..	6	2,022	1	11	430	..	1	1,701	..	3	5,275	..	32	1,083	..	..	4,496	1	30	..	..	..	..	..	1	..
3	Dietic „ ..	2	..	..	40	..	..	125	..	..	12	..	..	41	..	..	195	2	..	33	1	..	98	..	2	..	..	..	1	..	..	..
4	Parasitic „ ..	8	..	..	159	..	..	172	..	..	26	..	..	137	..	..	933	..	..	152	..	..	825	..	..	..	..	..	..	..	..	..
	Class II.																															
1	Diathetic Diseases ..	11	..	..	50	2	..	21	..	1	6	..	..	39	..	..	56	..	2	8	..	..	75	4	1	..	1	..	..	..	..	..
2	Tubercular „ ..	17	5	5	55	10	36	126	14	44	7	1	4	78	16	45	233	58	89	38	13	11	216	71	119	3	13	2	7	..	1	3
	Class III. Diseases of the—																															
1	Nervous System ..	10	..	3	131	1	28	162	4	24	18	..	3	55	1	16	374	19	92	65	5	13	272	14	67	1	2	3	..	1	..	3
2	Circulatory „ ..	4	1	2	42	10	32	49	9	23	6	2	1	37	8	18	184	28	74	12	4	3	134	20	70	3	7	..	..	..	..	3
3	Respiratory „ ..	82	..	1	499	6	12	687	6	8	88	..	1	312	2	16	1,433	19	50	214	2	1	1,024	25	30	..	1	..	..	..	..	..
4	Digestive „ ..	47	..	2	208	2	25	289	3	32	45	1	1	181	2	7	705	12	33	106	..	4	477	9	28	..	1	1	..	..	1	..
5	Urinary „ ..	2	1	1	20	2	4	32	1	..	10	3	1	10	..	2	43	..	4	12	..	..	49	2	7	2	..	1	..	..	2	..
6	Reproductive „ ..	9	..	..	88	..	4	109	..	5	19	..	..	42	..	..	201	..	2	25	..	..	145	..	6	..	..	..	..	..	..	..
7	Locomotive „ ..	..	..	..	44	..	10	39	1	5	4	..	2	21	..	3	105	..	20	11	..	1	65	..	17	..	..	..	..	..	..	..
8	Integumentary „ ..	109	..	..	909	1	5	725	..	10	158	..	1	456	..	3	1,911	..	9	446	..	1	1,899	..	7	..	..	..	..	..	..	..
	Class IV.																															
4	Diseases of Nutrition.	..	..	..	5	..	3	7	..	1	1	..	..	9	..	..	53	1	10	1	..	..	47	..	18	..	..	..	..	..	..	..
	Class V.																															
1	Accidents	109	1	1	821	4	15	823	4	15	150	1	1	311	2	2	1,463	10	23	274	1	2	1,062	10	15	..	..	..	1	1	..	..
3	Homicide	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..
4	Suicide	..	..	..	..	4	..	..	..	..	..	..	..	..	3	..	3	7	..	1	..	..	3	4	..	1	..	..	2	..	..	..
6	Corporal Punishment.	..	..	..	2	..	..	2	..	..	2	..	..	1	..	..	13	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..
	No appreciable disease	..	..	..	..	..	..	1	..	..	..	.	..	4	..	..	6	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..
	Total	698	10	17	5,702	49	196	6,432	50	200	1,198	7	17	4,126	38	117	16,149	179	496	3,324	28	36	13,442	180	474	12	26	12	11	2	5	8

Ratio per 1,000 of Mean Strength.

Order.	Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry Regiments.			Depôt Brigade Royal Artillery.			Infantry. Depôt Battalions.			Royal Engineers.	Coast Brigade, R.A.		Army Hospital Corps.		Commissariat Staff Corps	
	Strength	1,226			7,710			7,811			1,321			5,529			20,644			3,011			15,649			2,627	1,743		697		380	
		Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Died.	Died.	Invalided.	Died.	Invalided.	Died.	Invalided.
	Class I.																															
1	Miasmatic Diseases..	106·9	·81	1·63	128·8	·90	1·95	139·7	·90	2·69	159·7	..	·76	125·0	·72	·36	138·7	1·11	2·71	281·6	·67	..	150·1	1·15	2·36	·76	·57	1·72	..	..	..	..
2	Enthetic „ ..	122·1	..	..	212·2	..	·78	258 9	·13	1·41	325·5	..	·76	307 7	..	·54	260·3	..	1·55	359·7	..	..	300·1	·06	1·92	..	..	..	..	..	2·63	..
3	Dietic „ ..	1·6	..	..	5·2	..	..	16·0	..	..	9·1	..	..	7·4	..	..	9·5	·10	..	11·0	·33	..	6·3	..	·13	..	..	..	1·43	..	..	..
4	Parasitic „ ..	6·5	..	..	20 6	..	..	22·0	..	..	19·7	..	..	24·8	..	..	45·2	..	..	50·5	..	..	52·7	..	..	..	..	..	..	..	..	..
	Class II.																															
1	Diathetic Diseases ..	9·0	..	..	6·5	·26	..	2·7	..	·18	4·5	..	..	7·1	..	..	2·7	..	·10	2·7	..	..	4·8	·26	·06	..	·57	..	..	..	..	..
2	Tubercular „ ..	13·9	4·08	4·08	7·1	1·30	4·67	16·1	1·79	5·68	5·3	·76	3·02	14·1	2·90	8·14	11·3	2·81	4·61	11·0	4·31	3·65	13·8	4·54	7·60	1·14	7·46	1·15	10·66	..	2·63	7·89
	Class III. Diseases of the—																															
1	Nervous System ..	8·1	..	2·45	17·0	·13	3·68	20·7	·51	3·07	13·6	..	2·27	9·9	·18	2·89	18·1	·92	4·46	21·6	1·66	4·32	17·4	·89	5·56	·38	1·15	2·87	..	1·43	..	7·89
2	Circulatory „ ..	3·3	·81	1·63	5·4	1·30	4 15	6·3	1·15	2·94	4·5	1·51	·76	6·7	1·45	3·26	8·9	1·36	3·58	4·0	1·33	1·00	8·6	1·28	4·47	1·14	4·02	..	..	..	..	5·27
3	Respiratory „ ..	66·9	..	·81	64·8	·78	1·56	81·5	·77	1·02	66·6	..	·76	56 4	·36	2·90	69·4	·92	2·42	71·0	·67	·33	65·4	1·60	1·92	..	·57	..	..	..	..	..
4	Digestive „ ..	38·3	..	1·63	27·0	·26	3·23	37·0	·38	4·10	34·1	·76	·76	32·7	·36	1·27	34·1	·58	1·60	35·2	..	1·33	30·5	·57	1·79	..	·57	·57	..	..	2·63	..
5	Urinary „ ..	1·6	·81	·81	2·6	·26	·52	4·1	·13	..	7·6	1·51	·76	1·8	..	·36	2·1	..	·19	4·0	..	..	3·1	·13	·45	·76	..	·57	..	..	5·27	..
6	Reproductive „ ..	7·3	..	..	11·4	..	·52	14·0	..	·64	14·4	..	..	7·6	..	..	9·7	..	·10	8·3	..	..	9·3	..	·38	..	..	..	..	..	..	..
7	Locomotive „ ..	..	..	..	5·7	..	1·29	5·0	·13	·64	8·0	..	1·51	3·8	..	·54	5·1	..	·97	3·7	..	·33	4·1	..	1·09	..	..	..	..	..	..	..
8	Integumentary „ ..	88·9	..	..	117·9	·13	·65	92·6	..	1·28	119·6	..	·76	82·5	..	·54	92·6	..	·44	148·1	..	·33	121·3	..	·45	..	..	..	..	..	..	..
	Class IV.																															
4	Diseases of Nutrition	..	..	..	·6	..	·39	·9	..	·13	·8	..	..	1·6	..	..	2·6	·05	·48	·3	..	..	3·0	..	1·15	..	..	..	..	..	..	..
	Class V.																															
1	Accidents	88·9	·81	·81	106·	·52	1·95	105·4	·51	1·92	113·6	·76	·76	56·3	·36	·36	70·9	·48	1·12	91·0	·33	·67	67·9	·64	·96	..	..	..	1·43	1·43	..	..
3	Homicide	..	·81	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	·06	..	..	..	..	..	..	..	..
4	Suicide	..	..	..	..	·52	..	..	..	..	..	..	..	..	·54	..	·1	·34	..	..	·3	..	..	·26	..	·38	..	..	2·87	..	..	..
6	Corporal Punishment	..	..	..	·3	..	..	·2	..	..	1·5	..	..	·2	..	..	·7	..	..	..	..	..	·2	..	..	..	..	..	..	..	..	..
	No appreciable disease	..	..	..	..	..	..	·1	..	..	..	..	..	·7	..	..	·3	..	..	..	..	..	·1	·06	..	..	..	..	..	..	..	..
	Total	569·8	8·13	13·85	739·6	6·36	25·29	823 4	6·40	25·60	903·1	5·30	12·88	746·3	6·67	21·16	782·3	8·67	24·03	1104·0	9·30	11·96	858·9	11·50	30·29	4·56	14·91	6·88	15·78	2·86	18·16	21·05

United Kingdom.

MIASMATIC DISEASES. There has been a slight reduction in the prevalence of these diseases, except in the Depôt Brigade, R.A., in which the ratio of admissions has been 40 per 1,000 higher than in 1866. The influence of the principal diseases comprised in this class in causing sickness and mortality is shown in the following Table :—

		Annual Ratio per 1,000 of Mean Strength.							
		Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Depôt Brigade, Royal Artillery.	Depôt Battalions.
Eruptive Fevers	Admitted	4·1	1·7	2·4	·7	2·0	1·6	7·3	2·7
	Died	..	..	..	..	..	..	..	·06
Paroxysmal Fevers	Admitted	..	1·7	6·9	2·3	..	3·8	34·9	8·0
	Died	..	..	..	..	..	..	..	·13
Continued Fevers	Admitted	6·5	9·0	14·2	10·6	16·6	15·5	29·5	13·0
	Died	·81	·52	..	..	·72	·96	·06	·39
Dysentery and Diarrhœa	Admitted	20·4	10·2	17·7	8·3	14·7	12·3	19·3	13·2
	Died	..	·13	..	..	..	·05	..	·32
Sorethroat and Influenza	Admitted	30·2	36·8	32·9	59·0	48·3	33·7	102·3	49·3
	Died	..	..	..	..	..	..	..	..
Ophthalmia	Admitted	2·4	6·7	10·6	7·6	6·1	18·5	8·3	15·4
	Died	..	..	..	..	..	..	..	..
Rheumatism	Admitted	28·6	36·7	40·5	56·8	26·9	41·3	61·4	36·4
	Died	..	..	..	..	..	..	..	..

Eruptive Fevers.—The Depôt Brigade, R.A., furnished a high ratio of admissions by this group of diseases, chiefly from the prevalence of scarlet fever in the 1st Division at Sheerness and the 3rd at Warley. It also furnished an unusually high proportion of cases of *paroxysmal fevers* from the 1st Division at Sheerness and the 2nd at Woolwich. This has been due to the large number of men in these Divisions who had previously served in India, where they had contracted a liability to this form of fever.

Continued Fevers.—The highest proportion of these fevers occurred also in the Depôt Brigade, chiefly in the 2nd Division at Woolwich. The Foot Guards had the next highest proportion ; nearly one-half of the cases returned under this head occurred in the 1st Battalion Grenadier Guards ; the 2nd Battalion 2nd Regiment had the highest proportion in the Regiments of the Line. This was attributed in the latter corps to the exposure of the men when out with the Flying Column in Ireland during the period of the Fenian disturbances.

Dysentery and Diarrhœa were much less prevalent than in 1866 in all the arms.

Sorethroat and Influenza were more prevalent than in the preceding year in the Royal Artillery, Military Train, Foot Guards, and Depôt Brigade, R.A. ; in the last the excess occurred in the 3rd Division at Warley, consisting chiefly of the recruits of the corps.

Ophthalmia has not prevailed to any extent. The highest ratio of admissions was in the Infantry Regiments ; the cases occurred chiefly in corps which had suffered from the disease during their previous colonial service, and appeared to be excited by exposure to cold.

ENTHETIC DISEASES have given rise to a higher ratio of admissions than in 1866 in all the arms except the Household Cavalry, in which there has been a slight reduction. The Depôt Brigade, R.A., the Military Train, the Foot Guards, and the Depôt Battalions, furnished the highest proportions. In the

first of these the Depôt of the Horse Brigade, quartered at Maidstone, in the Foot Guards, the 1st and 2nd Battalions Grenadier and the two Battalions Coldstream Guards in London and Dublin, and in the Depôt Battalions, the 4th and 8th at Colchester, and the 14th at Sheffield, had a marked excess of cases. *United Kingdom.*

TUBERCULAR DISEASES.—The mortality by this class of diseases was lower than in 1866 in the Cavalry of the Line, the Royal Artillery, and the Royal Engineers, but higher in all the other arms except the Foot Guards, in which the proportion in the two years was identical. There was a marked reduction in the invaliding on account of these diseases in all arms.

The admissions into hospital, deaths, and discharges by invaliding in each of the corps included in these returns are shown in the following Table:—

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.	months.
1st Life Gds.	411	270	5	1	6	9	656·9	14·60	21·90	London	12
2nd „	410	177	1	1	2	5	481·7	4·88	12·20	London	3
										Windsor	9
R. Horse Gds.	405	251	2	..	2	3	619·7	4·98	7·41	Windsor	3
										London	9
Total Household Cavalry	1,226	698	8	2	10	17	569·3	8·16	13·85		
1st Dr. Gds.	508	499	6	2	8	22	982·3	15·75	43·31	Colchester	3
										Aldershot	9
4th „	547	423	2	1	3	21	773·3	5·48	38·39	Newbridge*	3½
										On march	1
										Aldershot	7½
5th „	545	335	1	..	1	11	614·7	1·83	20·18	Curragh, &c.*	7½
										On march	½
										Colchester	4
6th „	549	319	3	2	5	7	581·1	9·11	12·75	Cahir, Cork, &c.*	10
										Dublin	2
1st Dragoons	554	476	3	2	5	3	859·2	9·02	5·41	Manchstr. &c.	3½
										Curragh	6
										Longford, &c.	2½
2nd „	555	419	5	..	5	17	755·0	9·01	30·63	Dublin	7½
										Curragh	2
										Dundalk	2½
3rd Hussars	564	368	1	..	1	9	652·5	1·77	15·96	Aldershot	3
										Hounslow,&c.	9
8th „	552	563	3	2	5	9	1019·9	9·06	16·30	Birmingm.&c.	4
										Manchstr. &c.	8
9th Lancers	544	201	4	..	4	34	369·5	7·35	62·50	Dublin	9¾
										Cahir, &c.	2¾
10th Hussars	576	330	3	1	4	9	572·9	6·94	15·62	Dundalk, &c.	9½
										Curragh	2½
12th Lancers	550	401	..	..	..	12	460·0	..	21·82	Cork, &c.	5
										Curragh, &c.	4½
										Dublin	2½
14th Hussars	557	410	1	3	4	8	736·1	7·18	14·36	Hounslow,&c.	3
										On march	1
										Edinburgh	8
15th „	557	552	1	..	1	5	991·0	1·79	8·98	Aldershot	9
										Norwich, &c.	3
17th Lancers	552	406	2	1	3	28	735·5	5·43	50·72	Aldershot	7
										Brighton Shorncliffe	5
Total Cavalry of Line	7,710	5,702	35	14	49	195	739·6	6·36	25·29		

* These corps furnished small detachments also during the Fenian outbreak.

Regiments, &c.	Strength.	Admitted into Hospital.	Died.		Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000.			Stations.
			In Hospital.	Out of Hospital.			Admitted.	Died.	Invalided.	
										months.
										Mullingar 8
										Curragh 3 1/12
										Belfast 1/12
28th Foot ..	752	334	5	1	6	12	444·1	7·98	15·96	Detachts. at Sligo, Longford, Boyle, Londonderry, & Carrickfergus
										Enniskillen 8
39th „	751	380	3	..	3	12	506·0	3·99	15·98	with Detchts. at Newry, Armagh, and Drogheda
										Dublin 4
										Portsmouth 3 1/2
40th „ ..	626	595	2	1	3	25	950·5	4·79	39·94	Devonport 7
										Aldershot 1 1/2
										Portsmouth 5 1/3
43rd „ ..	751	670	3	..	3	10	892·1	3·99	13·32	Aldershot 6 2/3
										Dover 2 1/12
44th „ ..	659	495	2	1	3	14	751·1	4·55	21·24	Aldershot 9 5/12
										Curragh 3 1/4
										Dublin 8
										Fermoy 2/3
48th „	757	466	10	1	11	18	615·6	14·53	23·78	Detachts. at Tipperary, Lismore, Ballincollig, &c.
										Dublin 9
										Limerick 3
52nd „ ..	731	652	12	..	12	21	891·9	16·42	28·73	Detachts. at Clare Castle and Nenagh
										Manchester 7
										with Detchts.
54th „ ..	671	715	5	1	6	36	1065·6	8·94	53·65	at Weedon, Chester, and Tynemouth
										Aldershot 5
										Portland 2
										Aldershot 10
[illegible] „	660	534	2	2	4	17	809·1	6·06	25·76	Detachts. at Weymouth, Marchwood, & Hampton Ct.
										Buttevant 12
[illegible]	[illegible]	[illegible]	5	2	7	14	606·5	8·77	17·54	with numerous Detachments.
										Glasgow 7 3/4
										with Detchts.
						14	554·5	13·97	19·55	at Ayr and Paisley
										Dublin 4 1/4
										Aldershot 8 1/4
						17	890·3	5·85	24·85	Cork 2
										Kinsale 1 1/2
										Aldershot 3
						13	1036·2	13·39	17·40	Chan. Isles 9

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
Military Train	575	458	3	..	3	6	796·5	5·22	10·44	Aldershot	12
	302	295	..	..	..	7	976·8	..	23·18	Dublin	12
	444	440	3	1	4	4	991·0	9·01	9·01	Woolwich	12
Total ..	1,321	1,193	6	1	7	17	903·1	5·30	12·88		
Gren. Gds., 1st Bat. ..	738	587	5	1	6	15	795·4	8·13	20·32	London	8
										Windsor	4
2nd Bat. ..	808	684	7	..	7	13	846·5	8·66	16·08	London	12
3rd Bat. ..	806	638	6	4	10	18	791·6	12·41	22·33	London	12
Coldm. Gds., 1st Bat. ..	815	576	2	1	3	21	706·8	3·68	25·77	Dublin	2
										London	10
2nd Bat. ..	747	594	4	1	5	22	795·2	6·69	29·45	London	2
										Dublin	8
										Curragh	2
Scots F. Gds., 1st Bat. ..	809	571	4	..	4	28	705·8	4·94	17·34	London	6
										Windsor	6
2nd Bat. ..	806	476	2	1	3		590·6	3·72		Windsor	2
										London	10
Total Foot Guards	5,529	4,126	30	8	38	117	746·3	6·87	21·16		
2nd Foot, 2nd Batt.	757	654	4	..	4	16	863·9	5·28	21·14	Birr	5
										Athlone	7
										Detachts. at Galway, Castlebar, Mullingar, Sligo, & Boyle	
3rd Foot, 2nd Batt.	728	630	6	1	7	47	865·4	9·61	64·56	Belfast	11
										with numerous Detachments	
										Dublin	1
17th Foot, 1st Batt.	755	336	5	..	5	14	445·0	6·62	18·54	Devonport	3⅔
										Cork	1
										Kilkenny	7⅓
18th Foot, 1st Batt.	643	570	5	1	6	9	886·5	9·33	14·00	Aldershot	7⅔
										Chester	4⅓
										Detachts. at Liverpool, Bradford, & Weedon	
21st Foot, 1st Batt.	810	658	4	2	6	24	812·3	7·41	29·63	Dublin	6⅔
										Curragh	3⅓
										Enniskillen	2⅓
										Detachts. at Newry, Drogheda, & Armagh	

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations. months.
28th Foot ..	752	334	5	1	6	12	444·1	7·98	15·96	Mullingar 8 Curragh 3½ Belfast ⅝ Detachts. at Sligo, Longford, Boyle, Londonderry, & Carrickfergus
39th „	751	380	3	..	3	12	506·0	3·99	15·98	Enniskillen 8 with Detchts. at Newry, Armagh, and Drogheda Dublin 4
40th „ ..	626	595	2	1	3	25	950·5	4·79	39·94	Portsmouth 3½ Devonport 7 Aldershot 1½
43rd „ ..	751	670	3	..	3	10	892·1	3·99	13·32	Portsmouth 5⅓ Aldershot 6⅔
44th „ ..	659	495	2	1	3	14	751·1	4·55	21·24	Dover 2⅓ Aldershot 9⅔
48th „	757	466	10	1	11	18	615·6	14·53	23·78	Curragh 3⅓ Dublin 8 Fermoy ⅔ Detachts. at Tipperary, Lismore, Ballincollig, &c.
52nd „ ..	731	652	12	..	12	21	891·9	16·42	28·73	Dublin 9 Limerick 3 Detachts. at Clare Castle and Nenagh
54th „ ..	671	715	5	1	6	36	1065·6	8·94	53·65	Manchester 7 with Detchts. at Weedon, Chester, and Tynemouth Aldershot 5
56th „ ..	660	534	2	2	4	17	809·1	6·06	25·76	Portland 2 Aldershot 10 Detachts. at Weymouth, Marchwood, & Hampton Ct.
62nd „ ..	811	484	5	2	7	14	606·5	8·77	17·54	Buttevant 12 with numerous Detachments.
63rd „ ..	716	397	6	4	10	14	554·5	13·97	19·55	Glasgow 7⅔ with Detchts. at Ayr and Paisley Dublin 4⅓
65th „ ..	684	609	4	..	4	17	890·3	5·85	24·85	Aldershot 8½ Cork 2 Kinsale 1½
66th „ ..	747	774	6	4	10	13	1036·2	13·39	17·40	Aldershot 3 Chan. Isles 9

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died	Annual Ratio per 1,000. Invalided.	Stations.
										months.
67th Foot ..	652	381	3	..	3	22	584·4	4·60	33·74	Cork 3 Waterford 9 Detachts. at Youghal, Clonmel, Carrick, Cahir, &c.
68th „ ..	722	430	7	..	7	19	595·6	9·69	26·32	Portsmouth 5 Aldershot 7
70th „ ..	646	684	5	2	7	12	1058·8	10·84	18·58	Dover 4 Aldershot 5½ Ashton-under Line 2⅔ Detachts. at Carlisle, Bury, Leeds, and Whitehaven
71st „ ..	707	395	..	1	1	10	558·7	1·41	14·14	Fermoy 12 Detachts. at Cork, Ballincollig, Limerick, &c.
72nd „ ..	614	306	5	3	8	18	498·4	13·03	29·32	Edinburgh 4⅓ with Detacht. at Greenlaw Aldershot 5 Manchester 2
74th „ ..	595	505	4	3	7	8	848·7	11·76	13·44	Limerick 9 with Detchts. at Nenagh & Clare Castle Dublin 3
80th „ ..	658	637	4	2	6	15	968·1	9·12	22·80	Plymouth 3 Portland & Weymouth 4 Aldershot 5
81st „ ..	684	682	8	..	8	20	1075·7	12·62	31·55	Aldershot 1½ Chester, Weedon, & Liverpool 6 Cork 4½ Detachts. at Kinsale, Bandon, Skibbereen, and Youghal
85th „ ..	895	914	9	1	10	24	1021·2	11·17	26·82	Dublin 6½ Curragh 5½ with Detacht. at Carlow
89th „ ..	753	699	6	1	7	12	928·3	9·30	15·94	Aldershot 2⅔ Curragh 4 Dublin 4⅔ Detachts. at Carlow, Naas, & Mullingar
92nd „ ..	759	563	2	3	5	3	741·8	6·59	3·95	Dublin 6½ Curragh 5½
	20,644	16,149	142	37	179	496	782·3	8·67	24·03	

United Kingdom.

Regiments, Depôt Battalions, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.	months.
R.A. Dp. Brig.											
R.H.A. ..	381	479	3	1	4	6	1257·3	10·50	15·75	Maidstone	12
1st Div., D.B.	495	469	..	2	2	2	987·9	4·04	4·04	Sheerness	12
2nd „ „	1,117	1,266	12	..	12	18	1133·4	10·74	16·11	Woolwich	12
3rd „ „	1,018	1,090	8	2	10	10	1070·7	9·82	9·82	Warley	12
	3,011	3,324	23	5	28	36	1104·0	9·30	11·96		
Cavalry Depôt	1,189	1,245	9	3	12	15	1047·1	10·09	12·62	Canterbury	12
1st Dep. Bat.	1,048	845	10	2	12	28	806·3	11·45	26·72	Chatham	12
2nd „ ..	811	624	4	2	6	13	769·4	7·40	16·03	Chatham	12
3rd „ ..	725	615	6	..	6	19	848·3	8·28	26·07	Chatham	12
4th „ ..	1,103	948	8	..	8	11	859·5	7·25	9·98	Colchester	12
5th „ ..	1,116	1,004	11	1	12	101	899·6	10·75	90·50	Parkhurst	12
6th „ ..	782	596	8	..	8	21	762·2	10·23	26·86	Walmer Dover	10 2
7th „ ..	1,071	799	7	4	11	24	746·1	10·27	22·41	Winchester	12
8th „ ..	829	1,105	12	5	17	14	1332·9	20·51	16·89	Colchester	12
9th „ ..	1,275	1,236	13	6	19	39	969·4	14·90	30·59	Preston	12
10th „ ..	934	401	7	..	7	44	430·3	7·50	47·11	Shorncliffe	12
11th „ ..	1,013	1,025	14	2	16	37	1011·8	15·80	36·53	Gosport	12
12th „ ..	1,110	759	5	2	7	73	683·8	6·33	65·77	Shorncliffe	12
13th „ ..	1,034	601	15	1	16	12	581·3	15·47	11·61	Pembroke Dock	12
14th „ ..	801	901	11	3	14	12	1124·8	17·60	14·98	Sheffield	12
15th „ ..	808	738	7	2	9	11	913·0	11·14	13·61	Aberdeen, Dundee, Fort Geo., & Stirling	12
	15,649	13,442	147	33	180	474	858·9	11·50	30·29		

In the Household Cavalry the 1st Life Guards furnished the highest ratio of admissions, deaths, and invaliding. The excess of admissions was chiefly from sorethroat, bronchitis, diarrhœa, and dyspepsia, and of deaths from consumption.

In the Cavalry of the Line the proportion of admissions was highest in the 8th Hussars at Manchester and Birmingham, chiefly from venereal diseases; while it was lowest in the 9th Lancers quartered at Dublin and Cahir. The ratio of mortality was highest in the 1st Dragoon Guards at Colchester and Aldershot; and the 12th Lancers at Cork, the Curragh, and Dublin had not a single death during the year. The 9th Lancers had the highest, and the 1st Dragoons the lowest ratio of invaliding.

In the Royal Artillery the admissions were highest in the C Brigade, R.H.A., and lowest in the 7th Brigade, R.A., and the deaths and invaliding were highest in the 6th, and lowest in the 17th Brigade.

In the Foot Guards the 2nd Battalion Grenadier Guards furnished, as in 1866, the highest, and the 2nd Battalion Scots Fusilier Guards the lowest ratio of admissions; the 3rd Battalion Grenadier Guards the highest, and the 1st Battalion Coldstream Guards the lowest ratio of mortality; while the Coldstream Guards had the greatest, and the Scots Fusilier Guards the least amount of loss by invaliding.

United Kingdom. Among the Infantry Regiments the 81st, 54th, and 70th, had a very high ratio of admissions: the chief causes of the excess being, in the 81st, influenza, bronchitis, and ulcers; in the 54th, venereal diseases and itch; and in the 70th, venereal diseases, itch, and contusions. The 28th Regiment had the smallest proportion of admissions. The 85th, 74th, 66th, and 1st Battalion 21st, had a very large proportion of venereal cases. The mortality was highest in the 52nd Regiment, and lowest in the 71st; and the invaliding was highest in the 2nd Battalion 3rd Regiment, which had recently returned from the West Indies, and lowest in the 92nd, which was in its fourth year of home service.

RE-VACCINATION.—The results of vaccination in 1,939 soldiers and 15,994 recruits are shown in the following Table, framed from Abstract No. 2 in Appendix.

	Total number Vaccinated.	Results.	Ratio per 1,000. In those who bore marks of previous Small-Pox.	In those who bore good marks of previous Vaccination.	In those who bore doubtful marks of previous Vaccination.	In those who bore no marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits	1,939	A perfect Vaccine Pustule	240·4	335·6	299·2	396·1	322·3
		A modified ditto	326·9	299·7	387·6	297·0	324·9
		A failure..	432·7	364·7	313·2	306·9	352·8
		Total..	1000·0	1000·0	1000·0	1000·0	1000·0
Recruits..	15,994	A perfect Vaccine Pustule	202·5	255·0	321·1	440·7	263·6
		A modified ditto	373·7	350·8	406·6	299·6	351·6
		A failure..	423·8	394·2	292·3	259·7	384·8
		Total..	1000·0	1000·0	1000·0	1000·0	1000·0

Compared with the preceding year there has been a marked increase in the proportion of perfect vaccine results among the soldiers, and decrease among the recruits.

The proportion of men who had marks of small-pox and vaccination, or who had no satisfactory mark of either, among the recruits found fit for service at the Head-Quarters of Recruiting Districts during the year was as follows—

Recruiting Districts.	Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.	Proportion in every 1,000. Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.
London	353	4,847	202	65·3	897·3	37·4
Liverpool	216	2,200	122	85·1	866·8	48·1
Bristol	104	756	40	115·6	840·0	44·4
York	37	724	21	47·3	925·8	26·9
Glasgow	140	952	38	123·9	842·5	33·6
Belfast	32	981	11	31·3	958·0	10·7
Dublin	52	463	87	86 4	769·1	144·5
Total { England ..	710	8,527	385	73·8	886·2	40·0
Total { Scotland ..	140	952	38	123·9	842·5	33 6
Total { Ireland ..	84	1,444	98	51·6	888·1	60·3
Total ..	934	10,923	521	75·5	882·5	42 0

Compared with the results for 1866, this table shows a decrease in the proportion bearing marks of small-pox in Ireland, an increase in the recruits with marks of vaccination in Scotland and Ireland, and a slight increase in England and marked decrease in Scotland and Ireland of those having no satisfactory marks. Of the latter class, however, Ireland has furnished the highest proportion.

SANITARY REPORT.

Camp of Aldershot.

Inspector-General Lawson reports:—

The ratios per 1,000 of strength among the troops at Aldershot during 1866, as compared with those for 1867, show a rather higher rate of admissions in the latter year, but with a shorter duration of the cases, a smaller number constantly sick, and a less mortality; but the differences are too small to attach much weight to.

The Lock hospital has been in operation since June 1867; no diminution of the admissions from primary venereal affections is yet apparent; but on the other hand, many of the men have had the additional pay after re-engagement, and many received arrears for some months, which enabled them to spend more than usual, and this no doubt has been influential in increasing the attacks of primary venereal affections beyond the usual rate.

The married quarters and huts remain as previously. Since my arrival at the station in the end of September, most of the married soldiers have been accommodated in separate apartments, and few in barrack-rooms, and in the latter case they have always been without admixture with single men. Generally, when families embraced more than three children, two rooms were provided for their accommodation since September 1867.

Observations were made in the latter part of December 1867, and during January, February, and March 1868, on the temperature in an occupied and an unoccupied barrack-room, and also in an occupied and an unoccupied hut. From these it is obvious that when the external temperature was low, as from 26th December to 11th January inclusive (during which the temperature at 2 p.m was 31·8° only), with a consumption of 43½ lbs. of coal daily (the regular allowance), the thermometer in the occupied hut was 42·7° at 9 a.m., and 50·6° at 6 p.m., which is rather low for comfort. In the occupied room, with the regulated allowance of 57 lbs. of coal a-day, and 16 lbs. of coal and 12½ lbs. of coke in addition purchased by the men, the temperature ranged from 50° at 9 a.m. to 54° at 6 p.m, which is sufficient for healthy men.

United Kingdom.

In February the mean temperature was 43·2°, and during that month the men procured no fuel for themselves; the temperature in the occupied hut ranged from 52·2° at 9 a.m. to 58·0° at 6 p.m., and in the occupied room from 55·7° at 9 a.m. to to 57·5° at 9 p.m.

The weather during the winter here embraces periods with southerly winds, as during February 1868, when the present allowance of fuel is quite sufficient, and others with northerly winds, as from 26th December to 11th January, when that allowance would require to be increased at least one-third to afford the requisite warmth. If a mean temperature of 37° be taken as the dividing line, it will be found that all the milder weather will be warmer, while all the more severe will be considerably colder, and this consequently might be taken as the point below which, if the mean temperature fell for a few days, the extra issue should be made.

Ventilating grates with inlets, and air-extracting shafts are being gradually introduced in the permanent barracks as funds become available.

The latrines in the North Camp are unchanged. They are generally in very good order, so that the evils attending this arrangement are kept at a minimum.

The old-fashioned urine tubs still continue in use. The apparatus invented by Captain Lempriere, R.E., was found to be liable to the objection that the metal of which it was composed corroded, and its use was discontinued.

There are several different varieties of basins used in barracks, none of which are perfect. A good, cheap, serviceable basin for soldiers' ablutions is a desideratum. Of those at present in use, some are metal, placed on a bench and moveable; others are of enamelled metal and fixed; and a third kind is of delf. The first are apt to be imperfectly emptied and cleansed, and to become dirty, and the bench gets wet and sloppy; metal basins are all liable to become rusty. Those of delf are emptied by a lever. Soldiers often use their foot to make the requisite pressure on the lever, and so break the basins, which are costly.

Camp of Colchester.

Staff-Surgeon Poulton, Acting Principal Medical Officer at Colchester Camp, alludes to the quantity of meat in the soldier's ration being barely sufficient, especially for growing lads, who require a larger amount of animal food to promote their physical development in the early stage of military life.

The objectionable mode of issuing fuel, according to the number of inmates occupying a hut, has been abolished during the past year, and a regulated daily allowance substituted for it; this allowance, however, is not sufficient, and has to be constantly supplemented by the addition of one-third in cold and boisterous weather—the temperature of wooden huts at such times being considerably lower than that of brick buildings.

The surface drainage of the camp and hospitals has been rendered more complete by gradually raising the roads and walks between the lines, so as to allow the water to escape more readily into the tiled drains running along their sides, thus preventing any accumulation, and keeping the paths comparatively dry.

Increased accommodation has been afforded to the troops by the number of men occupying each hut having been reduced, by order from the War Department, from 22 to 20,—an arrangement which has been carried out to the utmost possible extent.

The accommodation assigned to married non-commissioned officers and men is extremely limited, many of them, with their families of three or more children, are closeted together in one small room, which has to contain all they possess, and serve the purposes of domestic life besides.

The mortality amongst the troops in this district is small in proportion to the strength, and their general sanitary condition may be regarded as satisfactory. The chief source of disease arises from the prevalence of venereal complaints, which fill the hospital wards, and constitute the principal element in reducing the effectiveness of a large military force.

Camp of Shorncliffe. *United Kingdom.*

Deputy Inspector-General Mure reports of the Camp at Shorncliffe:—The climate is very changeable, but does not appear to have acted prejudicially on the health of the troops. The stone barracks and huts have southerly, northerly, and westerly aspects, are situated on a plateau of 120 acres, 210 feet above the level of the sea, and at a distance of from 1,000 to 1,500 yards from it. The position is very healthy, though exposed, especially in spring and winter. The permanent barracks, of stone consisting of basement and one story, contain eight rooms. The wooden huts are built four rows deep, and form three sides of the parade ground, which is in the centre. Each hut is appropriated for 22 men. The brick foundations are rather low, by accumulation of shingle from time to time. The means of ventilation and warming the barracks and huts are sufficient to preserve the air pure and warm, except when the fire gets low in the morning. The cook-houses are supplied with Deane's patent cooking apparatus. The cooking arrangements have been satisfactory, and the meat is cooked in a variety of ways. The sanitary arrangements in the camp have been properly attended to, and no local causes of disease existed requiring removal. A gymnasium has, since last report, been erected in camp. There are also fives courts, and other minor exercises, which are greatly conducive to health. The number of admissions for zymotic disease has somewhat exceeded that of the previous year, chiefly attributable to cases of "scabies," introduced by the influx of recruits joining. From the crowded state of the camp, the receiving room for recruits had been occupied by troops. The very great majority of the miasmatic class of disease occurred among men who had contracted such affections on foreign stations, and were not attributable to any local causes.

Among the requirements, Dr. Mure mentions:—The women's washhouses require water to be introduced into them by pipes. Water should also be conveyed by pipes into the cook-houses. The surface drainage of camp and hospital requires improvement. Porches should be built at the entrance to the huts on the weather side, to prevent the rain beating in; and the urine tubs could be placed in them at night, instead of in the room.

South-Eastern District.

Deputy Inspector-General Mure in his Report says:—

At Dover the main guard-room at the new entrance to Dover Castle was enlarged, the room contiguous to it, formerly the kitchen of the provost, was made a part of the guard-room, giving 617 cubic feet instead of 340. Ventilating grates were put in the place of old grates. Ventilation of the infectious ward, Castle Hospital, has been improved by the construction of louvred openings placed near the ceiling, and by openings in the roof, or by tubes in the side walls. The ventilation of the married soldiers' quarters, servants' kitchens in officers' quarters and officers' stables, and soldiers' rooms in Keep Yard was improved by louvred openings in the walls.

The lock-up room, in the Citadel, where prisoners are temporarily detained, was too small, and additional accommodation has been provided by using an officers' guard-room which adjoins.

At Walmer, new married quarters are in course of construction to afford accommodation for 90 families; 30 have been already finished; the remainder will be ready by midsummer, and this will prevent any overcrowding in future. A gymnasium is in course of construction on a large scale, and is expected to be finished in June.

Dr. Mure offers the following suggestions for the improvement of the health of the troops:—

At Dover.—In the Cliff Casemates, two large baths and six foot-baths are required in the lavatory; also increased cubic space.

A sewer should be constructed for carrying away the soil from the latrine in the Garrison Provost, and also from that at the "Old Entrance" to the Castle.

In East Front Casemates, a porch should be erected, fitted with a night

United Kingdom.

urinal; this would prevent the excessive sunlight in summer and cold in winter.

In North and South Casemates, Western Outworks, a bath is required; also two baths in the lavatory at Castle Hill Fort.

The lock-up attached to the guard-room in Main Shaft Barracks requires more ventilation, as well as the cook-houses in Citadel Barracks. The erection of a covered skittle alley and fives' court is much required in the Citadel.

Fixed full-length baths, with means of privacy, are much required in Western Heights Hospital.

Strict police supervision is much needed at Dover, a station to which regiments are sent after returning from foreign service.

At Brighton.—The whole of the drainage and sewerage requires reconstruction and improvement. The barrack-rooms require to be remodelled.

At Canterbury.—The surface drainage generally requires improvement.

At Walmer.—A tailor's shop should be erected in place of the very defective one now in use. All the barrack urinals require flushing pipes to be fixed to them.

At Eastbourne.—The married soldiers' quarters in Ordnance Yard should be removed and others built.

Chatham District.

Deputy Inspector-General Bowen says:—No special causes, acting injuriously on the health of the men, have been reported to me. The barracks and hospitals are in good sanitary condition.

It is a prevalent opinion amongst the Medical Officers in charge of troops that an increase of meat in the ration is required. Such is also my own opinion, especially in the case of depôts, where there are many young soldiers; and when men are much employed on public works or fatigue.

Hot water should be supplied for ablution rooms; and there should always be a place for private washing, and prisoners confined in the guard-room should be obliged to wash in it before they are locked up.

The chief sanitary improvements have been as follows:—

At St. Mary's Barracks, a new ball alley has been built.

Ventilation of guard-room and cells improved, and the water supply has been improved.

At the Hut Barracks, the latrines have been roofed with slate, and the walls have been boarded, in lieu of corrugated iron.

At Upnor Barracks, some improvement in ventilation has been effected in some rooms lately officers' quarters.

At Chatham Barracks, the officers' racket court has been covered and enlarged, and a new billiard-room is in progress of erection.

The ventilation of the Garrison Chapel and School has been improved by the addition of a trefoil window at the east end.

In the gymnasium, a new elastic floor has been laid down in lieu of saw-dust.

At Brompton Barracks, the soldiers' privies have been re-constructed as water latrines. Those of the Main and South Square buildings are complete, that for the North Square is still in progress.

At Fort Pitt, the water supply has been improved.

The drainage of all the buildings and their vicinity seems to be in a very satisfactory state.

Woolwich.

Deputy Inspector-General Barrow reports:—During the last 12 months the general health of the troops has been satisfactory. The barracks and quarters have been in a fair sanitary state; the cubic space allotted to the men has been nearly in accordance with the Regulations, except in the case of the 17th Brigade and the 5th Brigade Royal Artillery. These corps have been unavoidably a little overcrowded. It would be desirable in the front range,

(in every instance where the strength of the building will admit of it,) to have the front and rear rooms thrown into one, and the wall separating them removed. It has been done in some instances with good effect. This would be particularly advantageous in the upper rooms, where the ceiling is very low. *United Kingdom.*

Many cases of scarlatina appeared during the year in the brick cottages on the Common,—occupied by soldiers' families. The sewer runs close to the rear, and open privies are placed directly over it. The sewer openings are all untrapped. Improvements are contemplated, but I hope these wretched cottages will be pulled down before long, and additional model Cambridge cottages erected.

The following are the principal sanitary services which have been executed at this station during the year 1867 :—

1. Garrison cells: improved ventilation.
2. Royal Artillery Barrack: new ash-bins.
3. Official House E, and Commanding Officer's Quarters, No. 2, Mill Hill, now Field Officers' Quarters, No. 10: fill up cesspools, and carry drain to main, in Brook Hill Road.
4. Grand Depôt Guard-house: fill up cesspit, and erect latrine, and connect with main drain.
5. Royal Engineers and Military Train Barracks: new ash-bins.
6. Chaplain's Quarters, L House: fill up cesspool, and carry drain to main, in Mill Lane; ventilate basement.
7. Old Gun Park: drain open privies into main sewer.

South-Western District.

Deputy Inspector-General C. A. Gordon, in his Sanitary Report for this district, says :—In the following enumeration of the sanitary defects connected with the barracks and hospitals in this district that have been reported during the year, it is considered that the purposes of convenience will be best suited if the steps taken to remedy those defects, or the reasons for their non-adoption, be given side by side with them :—

1st. Barracks.

The condition of Clarence Barracks, in Portsmouth, has been commented on by various Medical Officers. The buildings are old, and ill-suited for the accommodation of troops.	Sites for new barracks have been selected, and it is intended to connect the Clarence and Cambridge Barracks, so as to make one large one, plans having been submitted.
The Staff Serjeants' Quarters at Cambridge Barracks are reported as being old, confined, and badly ventilated.	Included in Estimates for 1867–8.
The Lock-up Room at Gosport Barracks is reported as insufficient in size, and as being without means of warming.	Has been represented to the military authorities by the Surgeon of the 11th Depôt Battalion.

2nd. Latrines, Urinals, &c.

Those at Clarence Barracks are described as being so near the barracks as to be offensive to the inmates of the latter.	Alterations will be made when the new barracks are erected.
Those in the barracks of the married soldiers at Gosport are reported objectionable, being in the range of building occupied by them, and a source of inconvenience.	Are being improved, and further alterations are to be included in the Annual Estimates.
Those at Fort Monckton have been reported as being faulty and offensive at flow of tide.	No complaint appears to have reached the Quartermaster-General's Department on this subject.
At Dorchester, as being old, and on the pit system.	Included in Estimates for 1868–9.

United Kingdom.

3rd. Drainage.

Defects are reported as existing in the drainage, &c., connected with Fort Monckton.	This was reported on some time since, and the drains were cleaned out; no complaint since made.
At Parkhurst, the drainage is also defective.	An entirely new system of drainage is in contemplation.
Also at Dorchester.	Improvements are under consideration.
At Winchester.	Will be remedied in connection with the new system of drainage for the city, about to be constructed.
At Brockhurst, the state of drainage was also unfavourably noted by the Surgeon of the 12th Brigade Royal Artillery.	Represented by Colonel Connell, R.A., President of Sanitary Committee, and pointed out to Dr. Massy, at his half-yearly inspection, on 23rd January, 1868.
	The "Local Sanitary Act" has not yet been adopted on the Gosport side of the water.

4th. Rations.

The Surgeon of the 12th Brigade Royal Artillery considers that the 12 ozs. of meat, which constitutes the daily ration of the soldier, is insufficient for healthy men.	This matter has not been the subject of correspondence.
The Medical Officer of 5th Depôt Battalion, at Parkhurst, makes a similar remark, and observes that breakfasts of only bread and tea are insufficient for growing lads.	
The Surgeon of 34th Regiment considers that it would be beneficial to the soldier were the daily ration of meat increased to 1 lb.	

5th. Baths.

Bathing arrangements at Gun Wharf Barracks reported deficient.	Represented by Medical Officer of Royal Artillery in 1863.
At Gosport, the ablution accommodation was considered deficient, and no means existed for private ablution.	Representations have been made to the authorities, with a view to remedy these defects.
The wash-house at Portland is stated to be too small.	Provided from Estimates, 1868–9.

6th. Water.

The water supplied to the troops at Sandown has been reported as containing impurities.	A requisition for filters has been forwarded.
The supply at Dorchester for ablution purposes is considered too small.	Included in Estimates for 1868–9.
So also at Parkhurst.	Included in Estimates 1868–9.
And at the Needles Battery the water was stated to be impure.	Tanks have been cleaned, and filters examined.

7th. Hospitals, &c.

There is no suitable dead-house at the hospital at Portland.	Estimates for a suitable dead-house have been submitted to the War Office.

The following sanitary improvements are included in Estimates, 1867–8:—

Portsmouth.—To connect drainage of the barracks with the new drainage of the borough. To remove a portion of Portsmouth Lines. To enlarge the

prisoners' room, and tailors' shop in Clarence Barracks. To enlarge the window in the non-commissioned officers' quarters in Gun Wharf Barracks. *United Kingdom.*

Hilsea.—To build a new canteen.

Gosport.—To erect an ablution room, and lay down pipes from upper storey. To connect the drains and catch pits. To improve the wash-house To provide water-tower, and tank for hospital.

Fort Gomer.—To improve the ventilation under the floor of the soldiers' quarters.

Tipner.—To provide covering for the main drain for 60 feet beyond the sea wall.

Parkhurst.—To provide a new dead-house. To provide an hospital bath-room.

The alterations and improvements below have been provided for in the Estimates for 1868–9, viz.:—

Portsmouth.—Improvements in the drainage of Clarence Barracks.

Gosport.—Bath-room for barracks. To improve lock-up room.

Parkhurst.—Small barrack-rooms to be thrown into one large one, capable of accommodating thirty men.

The hospital out-door privies to be converted into water-closets.

Dorchester.—That the latrines now existing be abolished, and replaced by closets. That Moule's earth closets be experimentally tried.

Portland.—To construct two additional small wards in hospital, and to provide two night urinals. To erect a canteen.

Weymouth.—Out-door lavatory of hospital to be converted into a bath-room.

Netley.

The Annual Sanitary Report of the Royal Victoria Hospital, Netley, submitted by Inspector-General W. M. Muir, C.B., Principal Medical Officer, contains remarks on the following heads:—

Admissions.—During the year 1867, 4,034 patients were admitted into the Royal Victoria Hospital, detail as under:—

Invalids from abroad	3,873
„ from Home stations	56
Men of the Army Hospital Corps	89
Casualties	16
Total admissions	4,034
Remaining from last year	160
Total treated	4,194

Overland Route.—Two batches of invalids, numbering each 347 and 216, have already, for the first time, been conveyed from India by this route, the first arriving on the 23rd November, 1867, the other on the 18th January, 1868.

On neither of these occasions were the men so carefully selected as it was supposed they ought to have been, in order to obviate the risk arising from sudden change of temperature and other inconveniences.

From all the evidence I could collect from Medical Officers in charge of invalids conveyed viâ the Cape, a very large proportion (such as fever, bowel, and hepatic affections) benefited much by the long voyage. It would appear, therefore, desirable to continue sending such by this route, and cases of a lighter character, or such as are not likely to suffer by sudden transition to a cold climate, by the new or overland one.

It has also been found, practically, that landing the men at the Jetty in the *winter season* is not always unattended with risk, heavy gales of wind being very frequent in the Southampton Water during December, January, and February. Railway transport seems at these times desirable.

United Kingdom.

Water Supply.—This has been very inadequate during the year—from exceptional causes, however; but at all times the supply is far below the requirements of this large establishment. On the arrival of a large batch of invalids, it is sometimes a week before *all* the men can have a bath, without which none ought ever to be sent to bed.

Swimming Bath.—The condition of the swimming bath is still unsatisfactory, owing to the uncertain and inadequate supply of water furnished by the Windmill pump. To put the latter in operation, a wind from the south or south-west is needed, and as, during several weeks and even months, this wind does not prevail, the pump is necessarily at a standstill. What is wanted to remedy this defect is a steam-pump, whereby water at all seasons and in any quantity can be forced up from the estuary.

Medical Officers' Quarters.—These are still in an unsatisfactory state as regards dryness of the walls, though somewhat improved by the coal oil painting to which their exteriors were subjected during the summer.

Lunatic Hospital.—The Lunatic Asylum is fast approaching completion, a great part of the building being already roofed in. No steps have yet been taken to plant or decorate the grounds.

Candidates' Quarters.—An increase of such is much required.

Urinals.—In April last, Professor Longmore, then acting as Principal Medical Officer, recommended that the slabs of slate in front of the several compartments of the urinals in the back squares should be removed, which was accordingly done, and they are now in a satisfactory state.

Meteorological Observatory.—The old hurdles by which the instruments have hitherto been fenced in were, towards the close of the year, replaced by a substantial wooden railing.

A new self-registering anemometer (Cassella's) has been erected at the end of the pier.

Desiderata.—1. A tram or horse railway from railway terminus to rear of main hospital building, and a like extension to Lunatic Asylum.

2. A telegraph office in the main building, chiefly in connection with that at the railway station.

3. A small female hospital, with attendant nurse, for the use of the invalided families.

4. A lighter form of lift introduced, the original ones being useless from their excessive weight.

Devonport and Plymouth.

Deputy-Inspector General Langley reports:—

The general health and sanitary condition of the troops serving in the garrison of Plymouth and Devonport during the past year, have been on the whole most satisfactory; no epidemic occurred.

Venereal disease still remains one of the chief sources of admissions. A careful investigation of the regimental returns shows that the increase was caused by the arrival, on the 26th of July, of the Depôt 1st Battalion 12th Regiment from Gosport; and the subsequent arrival of the Left Wing and Head-Quarters of the same corps from New Zealand in the following month, with arrears of pay at their disposal, soon swelled the number of affected men. Again, 70 recruits of Royal Artillery from the Depôt at Warley were added to the strength of the garrison in October, and a large number of them had to be admitted into hospital for the same disease. Previous to the month of August, the percentage of men diseased was actually less than the preceding year. My predecessor, Inspector-General Annesley, in former Reports, expressed a strong opinion that the location of troops, newly arrived from foreign service, in seaport towns, where they are exposed to so many temptations, is a fertile cause of a high rate of admissions into hospital for venereal disease, and in this opinion I quite concur. The Contagious Diseases Prevention Act continues to be productive of good results, although somewhat marred by there being no place in the district where the male civil population can receive the benefit of indoor treatment, and from the serious defect in the Merchant Seamens' Health Act, which empowers the captains of merchant

vessels to dismiss *summarily* any of their men disabled by venereal disease, thus allowing them to become fresh foci of disease. Amended Legislation on this point is much needed. *United Kingdom.*

The defective construction of the ventilating shafts in Raglan Barracks which allows a down draught of air on the beds immediately beneath them, and in some cases, in the upper rooms, the rain to enter, has been represented, both by my predecessor and myself.

The new gymnasium which was opened on 30th November 1866, cannot but contribute to the health, efficiency and physique of the soldier, and I am informed that the men appear to enjoy the training. The following statement shows the average increase of weight and growth of muscle of those who have passed through the course:—Of weight 5 lbs., of chest measurement 2 inches, forearm $\frac{5}{8}$ of an inch, upper arm $\frac{7}{8}$ of an inch. No accident worth noticing occurred.

The rations have been of good quality; the means of cooking sufficient, and the cooking itself sufficiently varied. Increased roof ventilation is however much required in the kitchen at Raglan Barracks, to allow of the free escape of steam, which now accumulates to an injurious extent. The latrines, urinals, drainage, and sewerage have been satisfactory.

The following improvements have been made during the past year: an additional bath has been added to the means of ablution, by the erection of a bath under the same roof as the ablution room in Old Granby Barracks; the main sewer pipe at the citadel has been extended into deep water; and the upper rooms in C Block, which were very cold before from there being no inner roof, are now boarded up and are being ceiled; and at Drake's Island the ventilation and lighting of the rooms have been much improved by the addition of extra windows, and porches have now been placed over the doors much to the comfort of the occupants; and a patent latrine has been substituted for the old-fashioned one previously in use by the women and children.

The hospital at Stoke is undergoing many changes and thorough repair. A new female hospital is about to be opened, but it is to be hoped that the restrictions to the admission of women who occupy lodgings or a separate room may be modified, in order that it may be made of more use to the wives and families of the married soldiers, than it can be so long as the present rule is strictly adhered to.

Northern District.

Deputy Inspector-General Bent, in his Sanitary Report for this district remarks:—

The only point in the accompanying returns calling for any special remark is the unusual sick ratio of the 57th Regiment, stationed at Salford.

This was caused by the great prevalence of venereal disease in that corps after its return from New Zealand in the fall of the year, when, after many months' service in the field and a long voyage, the men were exposed to the temptations and contamination of a large town, where no sanitary control over the prostitute class existed, and the consequence of rapid and extensive infection was inevitable.

This was duly represented to the authorities, coupled with a strong recommendation that special means of ablution should be provided for the men on their return to barracks at night, and a small additional lavatory has been constructed near the guard-room, furnished with basins, and with water laid on.

The disease has gradually declined both in severity and frequency.

North Britain.

Deputy Inspector-General Frazer, C.B., reports:—

There has been no epidemic or special cause of disease among the troops during the year.

The alleged causes of sickness and mortality referred to in the Sanitary Reports by the Medical Officers in charge of corps and detachments throughout

United Kingdom.

the Command accord with my own observations and experience, and with the results of my half-yearly inspections; and, as on two recent occasions, I have submitted to the authorities full reports of the sanitary defects of all the barracks and hospitals now occupied in Scotland, with recommendations in detail, calculated to improve the health of the troops in future, it is superfluous, and would, indeed, be impossible, to submit them all in this Report.

The leading sanitary improvements effected in course of the year in respect of increased cubic accommodation in barracks and hospitals have been as follows:—

During the last six months, Edinburgh Castle and Piershill barrack occupation has been fixed at the prescribed 600 cubic feet per bed; but the overcrowding at Leith Fort still continues. At Aberdeen Barracks there has been habitual overcrowding, varying from one to four beds and men per room. At Fort George Barracks, there was excessive overcrowding during their temporary occupation by the Militia Corps. Although in some of the barracks in Scotland the prescribed construction is somewhat under the 600 cubic feet per bed, yet, practically, the barracks at Glasgow, Hamilton, Ayr, Stirling, Perth, and Dundee have afforded the authorised cubic space, and in some instances considerably more, from their partial occupation.

The barrack-rooms at Leith Fort, and the remainder of the rooms at Perth Barracks, and the hospital wards at Dundee have been provided with inlets and shafts for ventilation, and with the re-modelled grates, within the year; but Edinburgh Castle, New Barrack, and Millmount Barracks, Glasgow Barracks and Hospital, Paisley Barracks and Hospital, and Dundee Barracks and Fort George Barracks (excepting nine rooms) and Hospital, are still without those means of ventilation which have been introduced into all the other barracks and hospitals occupied by troops.

The additional means of ablution afforded during the year have been two very small slate baths at Hamilton Barracks, an ablution room with fixed basins and bath, with water laid on at Glasgow Hospital, and a similar lavatory and bath at Stirling Hospital; a slate bath, without ablution room, in Perth Hospital, and two baths in the barrack ablution room; but Fort George, Dundee, Perth, Hamilton, and Ayr Hospitals are still unprovided with suitable lavatories and baths.

Excepting Fort George and Dundee Barracks, all the cook-houses are provided with ovens, though some of them, from the accidents of a bad oven, as at Paisley, or one out of repair, as at the New Barrack, Edinburgh Castle, do not furnish that variety of cooking, which is so desirable.

Fort George Hospital and Dundee Hospital are both without cooking ranges, so that the sick cannot have proper variety of cooking.

There has been no effective drainage of the barracks or hospitals carried out during the year, but it is urgently demanded at Fort George, where its re-construction, on account of the soakage and contamination of the wells, is under consideration; and the latrines at Hamilton, Perth, Dundee, and Aberdeen should be converted into water latrines, as in the other barracks in the Command.

Ireland.

The very short periods during which Inspector-General Dane, or his predecessor, Deputy Inspector-General Home, had served in the Command, precluded their commenting with any advantage on the various questions connected with the alleged causes of sickness and mortality among the troops, or the sanitary defects and improvements of 1867.

Dublin Division.

The following recommendations, made by Surgeon-Major Laing, at various times, have either been carried out or put into next year's Estimates:—

Cook-house of Military Train to be changed to the present wash-house, as it is much nearer the barrack-rooms.

Improved ventilation of cells at *Portobello Barracks.*

Increased space for the troops at *Drogheda*.

Better ventilation of cells at *Armagh* and at *Newry*.

Nuisance from a manufacturing chimney at *Belfast* was reported to the Mayor, and he promised to take it into consideration.

An ablution room in a more convenient place in the Cavalry Barracks at *Dundalk*.

Trapping of privies at *Greencastle*, on Lough Foyle; wells to be covered in and completed with pumps; rain-fall from the roofs to be collected.

Improved roof ventilation in the Castle Barracks at *Enniskillen*.

Bath to be put up at *Boyle*, also an oven to be built; ventilation of dry-room to be improved; rain-fall from the roof of hospital to be collected.

An ablution room to be constructed at *Sligo*.

Improved ventilation of dry-rooms at *Longford*.

Ventilation of privy at *Mullingar*, and the filling up of cess-pits in the barrack; rain-fall from the guard-room to be collected, and a verandah built in front of it.

Cook-house and lavatory to be built at *Athlone*.

At *Castlebar*, the surface drainage in Cavalry Barracks to be improved; kitchen and dry-room to be ventilated; a lavatory and bath to be built.

At *Galway*, an oven has to be put up in the kitchen; a lavatory and bath to be built; cells and dry-room to be better ventilated.

That the hospital accommodation in the division be increased in all wards to 1,200 cubic feet; this has been done as far as practicable by leaving one or more beds in each unoccupied, but the subject has not as yet been finally decided.

Every recommendation made to the military authorities has been carefully inquired into and attended to by them.

Curragh Camp and Newbridge.

Surgeon-Major Frazer, 10th Hussars, Principal Medical Officer for this camp and district, remarks:—

There have been no changes, so far as I am aware, in the extent or class of accommodation provided for the troops, with one exception—namely, the provision of separate accommodation for married soldiers by the division of huts into compartments, which is a very great improvement upon the custom that previously prevailed of accommodating several married people in one hut, without any other means of securing privacy than could be obtained by means of blankets and rugs, suspended so as to screen off a portion of the apartment.

Changes in respect to accommodation and re-appropriation have, I understand, been decided upon, but they have not been carried into effect yet.

Cork District.

Dr. Auchinleck, the Acting Principal Medical Officer, reports of the various Stations as follows:—

Cork (*Barracks*).—No bath accommodation, nor gymnasium: both are much required.

Kinsale (*Barracks*).—No ablution or bath-room; canteen tap-room badly ventilated.

(*Hospital.*)—The patients are obliged to wash in the wards, as there is no ablution or bath-room.

The means of cooking very deficient, consisting of a boiler and old-pattern grate.

Charles Fort (*Barracks*).—The ablution room consists of an ordinary chamber, with slate slabs and a stone floor, which is uniformly wet and offensive, and the water is not laid on.

(*Hospital.*)—No bath or ablution room; the patients have to wash in a small yard at the back of the hospital, or else in the wards.

United Kingdom.

There is only a common barrack grate for cooking.

Tralee (*Barracks*).—No bath accommodation.

The Canteen Tap-room has no special means of ventilation, and being seldom or never used, the air is never warmed.

(*Hospital.*)—No water supply within the hospital enclosure; the water required for cooking, baths, &c., having to be procured from a spring in its vicinity. No bath nor ablution accommodation.

The means of cooking very bad, and the preparation of the hospital diets has not, on the whole, been satisfactory. Low diet cannot be prepared at all, as there is only an old-pattern fire-place and two hot water boilers, but no oven.

Carrick-on-Suir (*Barracks.*)—The men can only have their meat boiled, as there is no oven in the cook-house.

(*Hospital.*)—Watercloset and bath-room much required.

Fermoy (*New Barracks*).—Soldiers' latrines of faulty construction.

Other Stations.—The reports from all other stations are satisfactory.

Section II.

On the Extent of Invaliding.

The number of men discharged the service as invalids from the troops serving in the United Kingdom during the year 1867, and from each arm of the service, is shown in the following Table :—

	Troops generally.	Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery (including the Depôt Brigade.)	Military Train.	Foot Guards.	Infantry Regiments.	Depôt Battalions.	Royal Engineers and Departmental Corps.
Strength	73,420	1,226	7,710	10,822	1,321	5,529	20,644	15647	3,704
1867.. Number discharged as Invalids	1,629	17	195	236	17	117	496	474	31
1867.. Ratio per 1,000 ..	22·18	13·85	25·29	21·66	12·88	21·16	24·08	30·29	8·37
1860–66, Ratio per 1,000	37·76	14·79	30·51	26·70	25·85	30·44	29·81	40·13	..

The invaliding in 1867 was lower in all arms than during the preceding year, and considerably under the average of the eight years. The disabilities which occasion the invaliding in each arm of the service will be found detailed in Abstract No. 1 in Appendix, and classified in the Table on p. 10 of this Report. Tubercular diseases have been the most prominent cause in all, except Infantry Regiments and the Depôt Brigade, R.A., in both of which diseases of the nervous system have slightly exceeded them. The predominance of tubercular diseases has been most marked in the Foot Guards.

Section III.

On the Number constantly Sick in Hospital of the Troops serving in the United Kingdom.

United Kingdom.

The following Table shows the proportion per 1000 of mean strength constantly non-effective from sickness among the troops in the United Kingdom generally, and in each arm of the service, with the average sick time to each soldier serving, and the average duration of the cases in Hospital.

		Troops generally.	Household Cavalry.	Cavalry of the Line.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Depôt Brigade Royal Artillery.	Depôt Battalions.
Mean daily sick per 1,000 of strength ..	1867..	42·47	27·43	33·99	42·30	38·80	45·92	37·24	47·96	41·76
	1860–6	50·09	31·96	42·92	50·60	50·97	52·27	43·61	61·13	48·17
		Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
Average sick time to each Man in the course of the Year	1867	15·50	10·01	12·41	15·44	14·16	16·76	13·59	17·50	15·25
	1860–6	18·28	11·67	15·67	18·47	18·60	19·08	15·92	22·31	17·58
Average duration of the Cases	1867	17·81	17·59	16·77	18·75	15·68	22·46	17·38	15·86	17·74
	1860–6	18·74	18·72	17·30	19·11	18·78	22·55	19·32	20·07	17·91

Compared with the results for 1866, there has been a trifling increase in the mean daily sick of the Troops generally. This has taken place in the Foot Guards and Infantry of the Line, the Depôt Brigade, R.A., and the Depôt Battalions; but in all of them the proportion has been under the average of the seven preceding years. There has been an increase in the same arms compared with 1866 of the average sick time to each soldier serving. There has been a slight increase in the duration of the cases in the Household Cavalry, Royal Artillery, Foot Guards, and Depôt Battalions; but a decrease in the other arms. In all of them, however, the sick time to each soldier and the duration of the cases has been under the average of the last seven years.

Section IV.

On the Influence of Age on the Mortality of Troops serving in the United Kingdom.

The mortality at different ages in quinquennial periods of life in each arm of the service, during the year 1867, is shown in the following Table, framed from Abstract No. 3 in Appendix.

United Kingdom.

Corps.	Annual Ratio of Deaths per 1,000 Living at the following Ages:—					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Household Cavalry	..	3·98	5·03	15·00	24·39	7·67
Dragoon Guards and Dragoons	3·01	3·28	7·11	14·45	8·67	5·98
Royal Artillery	1·62	2·49	4·66	15·96	7·58	..
Military Train	..	..	7·32	12·45	..	76·92
Foot Guards..	3·32	4·27	6·11	7·96	27·08	30·30
Infantry Regiments	3·13	7·44	7·80	13·14	13·73	25·46
Depôt and Coast Brigades Royal Artillery, and Depôt Battalions..	5·12	9·62	10·40	16·84	20·39	23·43
Ditto, ditto, 1859-66	5·34	8·85	11·85	16·61	28·87	29·32
Average of preceding, exclusive of all Depôts..	3·04	5·06	6·83	13·35	13·19	15·43
Ditto, ditto, 1859-66	3·01	5·78	7·90	12·09	16·02	19·60
Civil Male Population { England and Wales ..	7·41	8·42	9·21	10·23	11·63	13·55
Civil Male Population { Healthy Districts. ..	5·83	7·30	7·98	8·36	9·00	9·86

The mortality of the troops, exclusive of the Depôts, has been under the average of the preceding eight years at all ages, except 30 and under 35, when it has been a little in excess of the average. Among the men of the Depôts also it has been under the average, except at the ages 20 and under 25, and 30 and under 35. The more rapid increase of mortality with the advance of age among the men of the Depôts, compared with the rest of the troops, may be deemed to be the result of deterioration of constitution from service in unhealthy climates.

Section V.

On the Recruiting of the Army.

The returns show that 11,499 recruits were primarily inspected at the Head-Quarters of the Recruiting Districts; 6,038 at Regiments and Depôts; and 9,109 by Civil Medical Practitioners; making a total of 26,646. Of these 8,658 were rejected on primary, and 1,411 on secondary inspection, being a total of 10,069, or 378 per 1,000 inspected; a result which very closely approximates the ratio in 1866.

The proportion of rejections under each system of examination is shown in the following Table:—

United Kingdom.

	Number of Recruits Primarily Inspected.	Number Rejected.			Ratio of Rejections per 1,000 Examined.	
		Primary Inspections.	Secondary Inspections.	Total.	Primary Inspections.	Primary and Secondary Inspections.
At Head-Quarters of Recruiting Districts	11,499	4,435	458	6,855	385·7	390·7
At Regiments and Depôts	6,038	1,962			325·9	
By Civil Medical Practitioners ..	9,109	2,261	953	3,214	248·2	352·8
Total	26,646	8,658	1,411	10,069	324·9	377·8

The proportion rejected of recruits examined at the Head-Quarters of Districts, and at Regiments and Depôts, is almost identical with that of 1866; there has been a slight decrease in the rejections at primary, and increase at secondary inspections. There has been a decrease to the extent of 10 per 1,000 in the proportion of rejections of recruits examined by Civil Medical Practitioners; this has taken place entirely in the primary inspections, the proportion rejected at secondary inspections in the two years being identical.

The proportion rejected on secondary inspection of recruits primarily passed by Army Medical Officers, was 41 per 1,000, and of those primarily passed by Civil Medical Practitioners 139 per 1,000.

The results of the inspections at the Head-Quarters of each of the Recruiting Districts are shown in the following Table framed from Abstract No. 4 in Appendix.

Districts.	Total Number Inspected.		Ratio found Unfit per 1,000 Inspected.	
	Primary Inspections.	Secondary Inspections.	Primary Inspections.	Secondary Inspections.
London	4,592	2,755	357	111
Liverpool	2,660	1,049	372	172
Bristol	386	765	352	150
York	624	546	450	196
Glasgow	1,362	467	456	167
Dublin	1,157	323	370	87
Belfast	718	264	473	151
Total	11,499	6,169	386	138
Ratio in 1866	..	..	391	149

There has been a slight reduction compared with the results for 1866, in the rejections both at primary and secondary inspections. Belfast, as in that year, had the highest ratio of rejections, and Glasgow and York were not much behind it. There has been a marked reduction in the rejections at Liverpool, and increase at Bristol.

The native countries of the recruits inspected, are shown in the following Table :—

United Kingdom.

Native Countries of Recruits.	Head-Quarters of Recruiting Districts.		Head-Quarters of Regiments and Depôts.		By Civil Medical Practitioners.		Subsequently Rejected on Secondary Inspection.		Total.		Proportion Rejected per 1,000 Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Of those who had been found fit by Army Surgeons.	Of those who had been found fit by Civilians.	Primarily Inspected.	Rejected at Primary and Secondary Inspections.	
England	6,844	2,503	4,300	1,391	7,044	1,761	318	704	18,188	6,677	367·1
Wales	96	36	47	18	587	126	18	60	730	258	353·4
Scotland	1,276	538	492	162	1,205	290	88	72	2,973	1,150	386·8
Ireland	3,247	1,346	1,101	376	251	79	32	116	4,599	1,949	423·8
British Colonies and Foreign Countries ...	36	12	98	15	22	5	2	1	156	35	224·4
Total ...	11,499	4,435	6,038	1,962	9,109	2,261	458	953	26,646	10,069	377·8

Compared with 1866 there has been a decrease in the proportion rejected of natives of Wales, Scotland, and British Colonies and Foreign Countries; while there has been an increase of 1 per 1,000 in the natives of England, and 9 per 1,000 in those of Ireland rejected.

The proportion of recruits furnished by each country was as follows:—

By England and Wales	710·0	in every 1,000
Scotland	111·6	„
Ireland	172·6	„
Colonies and Foreign Countries ..	5·8	„

There has been a very marked decrease in the proportion of Irish, and increase in that of Scotch and English recruits.

The following Table shows the numbers inspected for each Arm of the Service, and the numbers found unfit:—

	Head-Quarters of Recruiting Districts.		Regiments and Depot Battalions.		Inspected by Civil Medical Practitioners.		Total Primary Inspections.		Rejected on Secondary Inspection.	Total.		Ratio of Rejections per 1,000 Recruits Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.		Inspected.	Rejected.	
Household Cavalry	...	...	184	69	...	...	184	69	6	184	75	407·6
Cavalry of the Line and Military Train	1,690	564	664	163	488	130	2,842	857	103	2,842	960	337·8
Royal Artillery and Engineers	2,201	859	1,721	614	1,673	329	5,595	1,802	291	5,595	2,093	374·1
Foot Guards	76	24	185	68	621	156	882	248	110	882	358	405·9
Infantry Regiments and Depôts	7,532	2,988	3,284	1,048	6,327	1,646	17,143	5,682	901	17,143	6,583	384·0
Total	11,499	4,435	6,038	1,962	9,109	2,261	26,646	8,658	1,411	26,646	10,069	377·8

There has been an increase in the proportion rejected, in 1867, of recruits for the Household Cavalry and Ordnance Corps, and a decrease in that for the Cavalry of the Line and the Foot Guards, while that for Infantry of the Line has been nearly identical in the two years. The highest ratio of rejections was in the Household Cavalry, and the lowest in the Cavalry of the Line.

The disabilities which gave rise to the rejection of recruits at primary and secondary inspections respectively, are shown in the following Table:—

RETURN showing the Number of Recruits Rejected during the Year 1867, with the Causes arranged in Classes, and the Ratio per 1,000 in each Class.

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.		Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		11,499		6,038		9,109		26,646				17,537		9,109		26,646	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.			Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
1	Syphilis	179	15·57	87	14·41	112	12·30	378	14·19	17	45	283	16·14	157	17·24	440	16·51
2	Other Zymotic Diseases	6	·52	14	2·32	13	1·43	33	1·24	1	3	21	1·19	16	1·75	37	1·39
3	Scrofula	125	10·87	51	8·45	35	3·84	211	7·92	4	11	180	10·26	46	5·05	226	8·48
4	Phthisis	49	4·26	56	9·28	46	5·05	151	5·67	21	14	126	7·19	60	6·59	186	6·98
5	Other Constitutional Diseases	38	3·30	28	4·64	31	3·40	97	3·64	9	8	78	4·45	39	4·28	117	4·39
6	Diseases of Brain, Spinal Cord, and Nerves	2	·17	2	·33	1	·10	5	·18	..	..	4	·22	1	·11	5	·19
7	Diseases of Eyes and Eyelids	461	40·09	237	39·26	257	28·22	955	35·85	48	116	746	42·55	373	40·95	1,119	42·00
8	Diseases of Nose and Mouth	23	2·01	4	·66	1	·10	28	1·05	2	7	29	1·65	8	·88	37	1·39
9	Diseases of Ears	7	·60	4	·66	..	..	11	·41	3	3	14	·79	3	·33	17	·64
10	Deafness	15	1·30	6	·99	3	·33	24	·90	2	4	23	1·31	7	·77	30	1·12
11	Impediment of Speech	15	1·30	1	·16	2	·22	18	·67	3	2	19	1·08	4	·44	23	·86
12	Disease of Heart	270	23·50	119	19·71	125	13·72	514	19·30	45	76	434	24·75	201	22·07	635	23·83
13	Disease of Arteries (Aneurism)	2	·17	4	·66	..	..	6	·22	..	..	6	·34	..	..	6	·22
14	Disease of Veins (Varix)	361	31·39	175	28·99	342	37·55	878	32·96	28	49	564	32·17	391	42·93	955	35·84
15	Disease of Lungs (except Phthisis)	51	4·44	23	3·81	67	7·36	141	5·29	9	22	83	4·73	89	9·77	172	6·45
16	Small or Malformed Chest, or Curvature of Spine	282	24·52	231	38·26	143	15·70	656	24·62	39	92	552	31·50	235	25·80	787	29·54

RETURN, &c.—*continued.*

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.				Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		11,499		6,038		9,109		26,646				17,537		9,109		26,646	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
17	Loss or Decay of many Teeth	221	19·22	85	14·08	61	6·70	367	13·77	28	47	334	19·05	108	11·86	442	16·59
18	Hernia	145	12·61	50	8·28	163	17·89	358	13·44	10	25	205	11·69	188	20·64	393	14·75
19	Laxity of Abdominal Rings, showing tendency to Hernia	123	10·70	65	10·77	49	5·38	237	8·90	13	36	201	11·46	85	9·33	286	10·73
20	Hæmorrhoids	55	4·78	5	·82	11	1·21	71	2·66	5	14	65	3·71	25	2·74	90	3·38
21	Diseases of the Urinary Organs	2	·17	1	·16	1	·10	4	·15	1	2	4	·22	3	·33	7	·26
22	Varicocele	222	19·31	123	20·37	200	21·96	545	20·46	34	44	379	21·61	244	26·79	623	23·38
23	Hydrocele	17	1·48	8	1·32	10	1·10	35	1·31	2	19	27	1·54	29	3·18	56	2·10
24	Other Diseases of the Genital Organs (not Venereal)	40	3·48	25	4·14	27	2·96	92	3·45	4	10	69	3·93	37	4·06	106	4·00
25	Muscular Tenuity	387	33·66	115	19·05	66	7·25	568	21·32	20	53	522	29·78	119	13·06	641	24·06
26	Debility	20	1·74	37	6·13	43	4·72	100	3·75	5	2	62	3·53	45	4·94	107	4·02
27	Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c. ..	129	11·22	57	9·44	34	3·73	220	8·26	9	18	195	11·12	52	5·71	247	9·27
28	Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c. ..	350	30·44	124	22·19	172	18·89	656	24·62	26	89	520	29·65	261	28·65	781	29·31
29	Diseases of Joints	38	3·07	11	1·82	28	3·52	67	2·51	1	6	45	2·56	31	3·40	76	2·85

RETURN, &c.—*continued.*

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.				Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		11,499		6,038		9,109		26,646				17,537		9,109		26,646	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
30	Other Affections of Bones and Muscles ..	14	1·21	6	·99	14	1·54	34	1·28	5	8	25	1·42	22	2·41	47	1·76
31	Ulcers, Wounds, and Cicatrices	195	16·96	55	9·11	64	7·03	314	11·78	10	28	260	14·83	92	10·10	352	13·21
32	Other Affections of Cutaneous System ..	86	7·48	20	3·31	57	6·26	163	6·12	4	10	110	6·27	67	7·36	177	6·64
33	Weakness of Intellect	27	2·34	6	·99	2	·22	35	1·31	3	5	33	1·88	7	·77	40	1·50
34	Malformation of Ears	3	·26	..	..	..	..	3	·11	..	4	3	·17	4	·44	7	·26
35	„ Nose and Mouth	24	2·08	..	..	..	..	24	·90	2	3	26	1·48	3	·33	29	1·08
36	„ Chest and Spine	127	11·05	19	3·15	18	1·98	164	6·15	5	16	151	8·61	34	3·73	185	6·94
37	„ Urinary and Genital Organs	..	..	2	·33	1	·10	3	·11	1	..	3	·17	1	·11	4	·15
38	Marks of Punishment or letters D or B C..	18	1·57	14	2·32	4	·43	36	1·35	9	9	41	2·34	13	1·43	54	2·03
39	Unsound Health	311	27·05	82	13·58	60	6·59	453	17·00	20	51	413	23·55	111	12·18	524	19·67
	Not known	..	..	..	..	3	·33	3	·11	..	..	..	..	3	·33	3	·11
	Total	4435	385·69	1962	324·94	2261	248·21	8,658	324·93	458	953	3855	390·89	3214	352·84	10,069	377·88

United Kingdom.

There has been a reduction in the proportion rejected at the primary inspections by all the three classes of examiners on account of small or malformed chest, or curvature of spine. There has been a decrease under muscular tenuity among the district recruits, but an increase at the Regiments and Depôts; a decrease in the diseases of eyes and eyelids in the Districts, and an increase among the recruits examined by Civil Medical Practitioners; a decrease of varicocele among the Civil Practitioners' recruits; and of malformation of chest and spine among those inspected at the Recruiting Districts, and at Regiments and Depôts. Loss or decay of many teeth, and ulcers, wounds, and cicatrices, show an increase in the returns from Head-Quarters of Recruiting Districts; and phthisis and defects of lower extremities in those from Regiments and Depôts. Taking the combined results of primary and secondary inspections, there has been a reduction of 6 per 1,000 in the rejections for small or malformed chest; and to about half that amount for varicocele; while there has been an increase of above 3 per 1,000 on account of loss or decay of many teeth; and also an increase of about 2 per 1,000 for lung diseases, except phthisis.

The following Table, framed from Abstract No. 6 in Appendix, shows the proportion of recruits at each age in every 1,000 examined:—

Proportion in 10,000 Examined.	Boys under 17.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	24 to 25.	25 and upwards.
At Head Quarters Recruiting Districts ..	87	664	2,884	1,599	1,325	1044	762	651	665	319
At Regiments and Depôts ..	637	1761	2,537	1,355	1,058	834	624	531	447	216
By Civil Medical Practioners	34	812	2,970	1,637	1,270	926	874	660	714	103
Total ..	180	940	2,844	1,563	1,251	959	773	630	638	222

There has been an increase in the proportion enlisted of lads under 18, and a decrease between the ages of 18 and 20.

The heights of the recruits inspected are shown by the following Table, calculated from the numbers in Abstract No. 7 in Appendix.

Proportion in 10,000.	Inspected at Head-Quarters Recruiting Districts.	Inspected at Regiments and Depôts.	Inspected by Civil Medical Practitioners.	Total.
Ft. In. Ft. In.				
Under 5 3 ..	100	493	29	155
5 3 to 5 4 ..	94	374	4	120
5 4 „ 5 5 ..	421	1,325	83	486
5 5 „ 5 6 ..	3,290	2,038	2,752	2,845
5 6 „ 5 7 ..	2,606	1,932	2,880	2,565
5 7 „ 5 8 ..	1,638	1,746	1,977	1,779
5 8 „ 5 9 ..	920	927	1,204	1,021
5 9 „ 5 10 ..	532	506	602	551
5 10 „ 5 11 ..	276	212	310	276
5 11 „ 6 0 ..	86	201	105	116
6 0 and upwards	37	246	54	86

There has been an increase compared with the results for 1866, in the proportion of men at all the heights between 5 ft. 6 in. and 5 ft. 11 in.; and a decrease in the proportion at the other heights, except boys under 5 ft. 3 in. who are all taken by special authority. The increase has been most marked at the height 5 ft. 6 in. to 5 ft. 7 in.

The weights of the recruits inspected at the Head-Quarters of the Recruiting Districts are shown in the following Table, framed from Abstract No. 8 in Appendix.

lbs.		lbs.		
Under 100				200
From 100	to	110		433
„ 110	to	120		1,811
„ 120	to	130		3,019
„ 130	to	140		2,367
„ 140	to	150		1,420
„ 150	to	160		622
„ 160	to	170		93
„ 170 and upwards				35
				10,000

There has been an increased proportion at weights under 110 lbs.; a necessary consequence of the larger proportion of lads enlisted during the year. Above that weight there has been a marked increase in the proportion of men from 140 lbs. to 160 lbs. weight, while above that weight the proportion in the two years has been identical.

The state of education among the recruits inspected at the Recruiting Districts, and at Regiments and Depôts, is shown in the following Table, framed from Abstract No. 9 in Appendix. There is no available information respecting those examined by Civil Medical Practitioners.

Of every 1,000 Recruits Examined.	Unable to Read or Write.	Able to Read only.	Able to Read and Write.
At Head-Quarters of Recruiting Districts	264	87	649
At Regiments and Depôts	141	147	712
Total	222	107	671

These results show a larger proportion wholly uneducated than in 1866, the excess being among the District Recruits, and also a larger proportion able to read only, the excess being in those examined at Regiments and Depôts.

The following Table shows the occupations of the recruits inspected, and the numbers of each class of occupation rejected during the year.

Occupations of Recruits.	Number Inspected.	Rejected on Primary Inspection.	Rejected on Secondary Inspection.	Total Rejected.	Ratio per 1,000 Rejected.
1. Labourers, Husbandmen, and Servants	15,758	4,986	828	5,814	368·9
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.)	4,205	1,387	188	1,575	374·5
3. Mechanics employed in Occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.)	4,359	1,574	311	1,885	432·4
4. Shopmen and Clerks	1,697	618	73	691	407·2
5. Professional Occupations, Students	196	51	4	55	280·6
6. Boys	431	42	7	49	113·7
Total	26,646	8,658	1,411	10,069	377·8

United Kingdom.

This Table shows an increased proportion in the rejections of recruits of the first, third, and fourth classes, compared with the results for 1866, and a decrease in the other classes. As in 1866, if we omit the boys as being in every way exceptional, the ratio of rejections has been lowest in the class of professional occupations.

The proportion of recruits furnished by each group of occupations was as follows:—

1. Labourers, Husbandmen, and Servants	591·4
2. Manufacturing Artizans (as Clothworkers, Weavers, Lacemakers, &c.)	157·8
3. Mechanics employed in occupations favourable to physica development (as Carpenters, Smiths, Masons, &c.) ..	163·6
4. Shopmen and Clerks	63·7
5. Professional occupations, Students	7·3
6. Boys	16·2
Total	1000·0

Compared with the preceding year there has been a marked decrease in the proportion of labourers, husbandmen, and servants enlisted; while there has been an increase in the manufacturing artizans and mechanics, a result, there is too much reason to suppose, of the generally depressed state of trade during the year.

II.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

Section I.—*Sickness and Mortality.*

I.— GIBRALTAR.

STATISTICAL REPORT.

Gibraltar.

In the course of the year the 1st Brigade Royal Artillery was relieved by the 15th Brigade, two batteries of which came from home, two from Bermuda, and the remainder from Nova Scotia. In April the 83rd and 75th Regiments, and in June the 1st Battalion 13th Regiment, from Ireland, relieved the 86th and 32nd Regiments which embarked for the Mauritius, and the 78th Regiment for Canada.

The average strength of the troops during the year was 4,555; the admissions into hospital were 3,234; and the deaths 29, of which 3 occurred out of hospital; there were also 6 deaths among the invalids sent to Netley for discharge, which make the total for the year 35. These numbers give the proportions of 710 admissions, and 7·69 deaths per 1,000 of mean strength, both considerably in excess of the preceding year.

The admissions and deaths, in each corps, are shown in the following Table:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	686	668	2	..	1	3	973·8	4·37
Royal Engineers	281	215	1	1	1	3	765·1	10·68
1st Battalion 13th Regiment ..	366	301	3	..	..	3	822·4	8·20
2nd „ 15th „ ..	686	353	5	1	1	7	514·6	10·20
32nd Regiment	254	106	1	..	1	2	417·3	7·87
75th „	485	586	4	1	..	5	1208·2	10·31
78th „	369	213	1	..	1	2	577·2	5·42
83rd „	449	398	4	..	..	4	886·4	8·91
86th „	224	88	2	..	..	2	392·9	8·93
87th „	719	299	3	..	1	4	415·9	5·56

It will be observed that the Regiments which were stationed at Gibraltar the whole year had a much smaller proportion of admissions than those which arrived in the Command during the year. The difference was, in a great measure, due to the latter having arrived just before the commencement of the season when there is always a marked increase in the prevalence of disease in the garrison.

Gibraltar. The influence of the different classes of diseases in causing the sickness and mortality, is shown in the following Table. The details, for 1867, will be found in Abstract No. 10 in Appendix.

Orders.	Diseases.	1867. Average Strength, 4,555.						1859-66.		1867. Infantry at Home.	
		Admitted into Hospital.	Deaths.		Total Died.	Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.	
			At Gibraltar.	Of Invalids.		Admitted.	Died.	Admitted.	Died.	Admitted	Died.
	Class I.										
1	Miasmatic Diseases ..	846	6	..	6	185·7	1·32	250·1	5·05	138·7	1·11
2	Enthetic „ ..	975	..	..	..	214·1	..	181·0	..	260·3	..
3	Dietic „ ..	57	1	..	1	12·5	·22	12·7	·09	9·5	·10
4	Parasitic „ ..	30	..	..	..	6·6	..	7·0	..	45 2	..
	Class II.										
1	Diathetic Diseases ..	20	1	..	1	4·4	·22	3·7	·09	2·7	..
2	Tubercular „ ..	63	4	4	8	13·8	1·75	7·7	1·20	11·3	2·81
	Class III. Diseases of the—										
1	Nervous System ..	68	3	..	3	14·9	·66	17·5	·31	18·1	·92
2	Circulatory „ ..	33	3	1	4	7·3	·88	6·6	·74	8·9	1·36
3	Respiratory „ ..	155	5	..	5	34·0	1·10	50·3	·36	69·4	·92
4	Digestive „ ..	174	1	..	1	38·2	·22	34·9	·28	34·1	·58
5	Urinary „ ..	11	1	..	1	2·4	·22	2·4	·16	2·1	..
6	Reproductive „ ..	55	..	..	..	12·1	..	16·6	..	9·7	..
7	Locomotive „ ..	11	..	1	1	2·4	·22	4·4	·05	5·1	..
8	Integumentary „ ..	409	..	..	..	89·8	..	117·1	..	92·6	..
	Class IV.										
4	Diseases of Nutrition	17	..	..	..	3·7	..	2·2	·02	2·6	·05
	Class V.										
1	Accidents	306	3	..	3	67·2	·66	75·7	·38	70·9	·48
3	Homicide	..	..	..	..	..	..	..	·07	..	..
4	Suicide	2	1	..	1	·4	·22	·2	·31	·1	·34
5	Execution	..	..	..	..	..	..	..	·07	..	..
6	Corporal Punishment	1	..	..	..	·2	..	3·0	..	·7	..
	Diseases not stated ..	..	..	..	..	..	..	1·8	..	..	..
	No appreciable Disease	1	..	..	..	·2	..	·7	..	·3	..
	Total	3,234	29	6	35	709·9	7·69	795·6	9·18	782·3	8·67

Although the ratio both of admissions and deaths has been higher than in 1866, it has been considerably under the average of the last seven years. The decrease has been chiefly in miasmatic diseases, and those of the respiratory and integumentary systems; but the admissions by venereal diseases have been considerably above the average.

The excess in the admissions, over those of 1866, has been chiefly in miasmatic and venereal diseases, and those of the digestive system.

The sickness and mortality have been higher than among the Infantry Regiments serving at home during the same period. The excess of admissions

has been chiefly in miasmatic diseases and those of the integumentary system; that of deaths, in miasmatic diseases. The proportion of cases of venereal diseases has been much lower at Gibraltar, than among the troops in the United Kingdom.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases in this class have been as follows:—

Miasmatic Diseases.	Admitted.	Died.	Annual ratio per 1,000. 1867. Admitted.	1867. Died.	1859–66. Admitted.	1859–66. Died.
Eruptive Fevers	3	..	·7	..	1·6	·12
Paroxysmal „	12	..	2·6	..	5·3	·09
Continued „	324	4	71·1	·88	78·9	2·01
Dysentery and Diarrhœa	143	2	31·4	·44	54·4	·96
Spasmodic Cholera	..	..	..	..	2·9	1·82
Sorethroat and Influenza	126	..	28·1	..	19·7	..
Ophthalmia..	129	..	28·3	..	41·1	..
Rheumatism	96	..	21·1	..	36·1	..

The admissions have been below the average in all these diseases, except sorethroat and influenza which show a slight excess.

Compared with the results for 1866, there has been a considerable increase in continued fevers, dysentery, and diarrhœa, but a slight decrease in the other diseases.

Continued Fevers were more than twice as prevalent as in 1866, from the occurrence of an epidemic, of a mild type, in the last quarter of the year. It is stated to have closely resembled the dengue fever of the West Indies. It was believed to have been introduced from Cadiz, where it prevailed to a great extent among the civil population. Deputy-Inspector-General Rutherford, observes that, "it was generally remarked that when one member of a family was attacked, the disease spread through the entire household. About two-thirds, it is believed, of the inhabitants of Gibraltar suffered from it, although many of the cases were of so mild a character as scarcely to be observed. There were no fatal cases among the troops; but some of the oldest and most feeble of the civil population are said to have sunk from the extreme prostration consequent on the attack." The Royal Artillery, the 75th and 87th Regiments furnished the largest proportion of cases among the troops.

ENTHETIC DISEASES were above the average of the preceding eight years, and greatly in excess of the proportion in 1866. The difference was confined to the group of syphilitic diseases, the gonorrhœal being nearly identical in the two years. The 2nd Battalion 15th Regiment, the 15th Brigade Royal Artillery, and the 78th Regiment furnished the largest number of cases. No special explanation is given of the increased prevalence of these diseases.

ACCIDENTS AND VIOLENCE.—Two men were found drowned at the North Front. A man of the 15th Regiment, while larking in the barrack-room, fell and fractured his spine, he recovered from the accident in seventeen weeks. A sapper of the Royal Engineers committed suicide by shooting himself with his carbine.

SANITARY REPORT.

Deputy Inspector-General Rutherford, in his Annual Sanitary Report of the station, writes—

I do not find in any of the Sanitary Reports of the Medical Officers in charge of corps and detachments in this garrison, any special causes mentioned

Gibraltar. which have prejudicially affected the health of the troops, excepting in the following instances :—

The Surgeon of the 13th Regiment states, in paragraph 9 of his Report, that 2 men died from dysentery while under canvas at the North Front, at rifle instruction, "the disease was induced by drinking impure water, cheap "wines and bad spirits." The Surgeon, Royal Artillery, alluding to zymotic diseases, states that "they may be attributed to epidemic and atmospheric "causes, want of proper drainage and water supply, intemperance, and faulty "construction of some of the barracks. One of the causes of phthisis "pulmonalis is probably overcrowding in barrack-rooms, &c."

Continued fevers, according to the opinion of the Surgeon of the Royal Engineers, arise "from the insanitary condition of the garrison."

The Surgeon-Major 75th Regiment alludes to "defective drainage being "the cause of typhoid fever at Buena Vista Barracks"; and among the causes of phthisis pulmonalis, the Surgeon-Major 78th Highlanders enumerates, "overcrowding and bad ventilation."

In many of the Reports furnished by the Medical Officers, allusions are made to the various insanitary defects existing in the respective barracks occupied by the troops under their medical charge. Some of these, in consequence of the recommendations of the Commission on Barracks and Hospitals, have been remedied, and further improvements are being gradually introduced. A very large amount of work, however, still remains to be done.

There is one very important subject to which I beg to invite attention, viz., the great dearth of proper married quarters in the garrison, more especially for the corps occupying the "North District," and notably for those stationed in the South Barracks, the Town Range, and contiguous barracks, in which latter, excepting for some married serjeants, there is no separate married accommodation whatever. Considerable, although far from adequate, improvements in this particular have been effected for some of the regiments in the south, but little for those stationed in the situations alluded to, where, owing to the confined locality and other insanitary circumstances, separate accommodation for the class of individuals in question is more imperatively required. Besides, a measure so indispensably necessary, more especially in such a climate as that of Gibraltar, where the present married accommodation (not separate) is so very bad, might supersede the necessity of establishing a "General Female Hospital."

The following are the Sanitary services executed during the year 1867-8, as furnished by the Commanding Royal Engineer.

General Hospital.—Dispensary and Dispenser's Quarters completed, and reconstruction of water-closet in progress.

Beuna Vista Barracks.—Providing outlet pipe for drainage to sea in progress, to be completed by March 1868.

King's Bastion.—12-inch iron pipe laid from latrines across outer breakwater. Fitments of soldiers' and women's latrines fixed.

Prince Albert's Front.—Latrines and urinals completed. Dredging portions of ditch line wall, and forming openings in breakwater, and lengthening outlet pipe Wellington Front.

Commissariat Bakery.—Reconstructing latrine accommodation.

Town Range Infantry Guard-room.—Improved, boarded and ventilated, &c.

New North Front Guard.—Enlarged, and improved water-closet, urinal, and ablution rooms.

Devil's Tower Guard.—Boarded floors and sashes, and otherwise improved.

Married Soldiers' Quarters, Windmill Hill.—Two blocks of soldiers' quarters, each completed and occupied.

Europa.—The second block of 16 quarters completed and occupied. Latrines and washing places, &c. provided.

Catalan Bay Barracks.—Drainage to the sea.

There is very ample and good accommodation in the garrison hospital, and some wards are altogether vacant.

No bed has less than 1,200 cubic feet of space, and very many considerably more.

II.—Malta.

STATISTICAL REPORT.

During the year the 3rd Brigade Royal Artillery, the 29th Regiment, and 1st Battalion 60th embarked for Canada, and the 84th Regiment for Jamaica; being relieved by the 10th Brigade Royal Artillery from Canada, and the 1st Battalion 14th, the 31st, and 64th Regiments from Ireland. *Malta.*

The average strength of the troops, exclusive of the Royal Malta Fencible Artillery, was 4,919; the admissions into hospital during the year were 4,247, and the deaths 119, of which 100 occurred in, and 17 out of hospital, and 2 among the invalids sent to England for discharge. The admissions, therefore, were in the ratio of 863, and the deaths of 24·19 per 1,000 of the strength; the former being under, but the latter double the proportion in 1866.

The following Table shows the average annual strength, the admissions and deaths in each corps during the year:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	589	434	9	2	..	11	736·8	18·68
Royal Engineers	178	153	1	..	..	1	859·5	5·62
1st Battalion 8th Regiment ..	690	829	26	2	1	29	1201·5	42·03
2nd „ „ „ ..	687	517	7	2	..	9	752·5	13·10
1st „ 14th „ ..	228	362	18	2	..	20	1587·7	87·72
„ „ 24th „ ..	658	553	7	2	..	9	840·4	13·68
29th Regiment	357	207	4	2	1	7	579·8	19·61
31st „	352	289	11	1	..	12	821·0	34·09
1st Battalion 60th Regiment ..	442	269	4	1	..	5	608·6	11·31
64th Regiment	533	559	7	3	..	10	1048·8	18·76
84th „	98	55	3	..	..	3	561·2	30·61

The other three deaths were those of a staff-serjeant and of two privates of the Army Hospital Corps.

The admissions were extremely high in the 1st Battalions 8th and 14th, and the 64th; and the deaths in the 1st Battalions 8th and 14th, and the 31st Regiment. The 8th was on the Island during the whole year; the 64th arrived from Ireland in February, the 31st in June, and the 14th in the end of August.

The following Table, framed from Abstract No. 10 in Appendix, shows the admissions and deaths by classes of diseases:—

Malta.

Orders.	Diseases.	1867.—Strength, 4,919. Admitted into Hospital.	Deaths. In Malta.	Deaths. Of Invalids.	Total Died.	Annual ratio per 1,000 of Strength. Admitted.	Annual ratio per 1,000 of Strength. Died.	1859–66. Annual ratio per 1,000 of Strength. Admitted.	1859–66. Annual ratio per 1,000 of Strength. Died.
	Class I.								
1	Miasmatic Diseases..	2,164	68	..	68	439·9	13·83	406·5	6·22
2	Enthetic „ ..	268	..	..	..	54·5	..	81·4	..
3	Dietic „ ..	109	3	..	3	22·2	·61	12·9	·13
4	Parasitic „ ..	24	..	..	..	4·9	..	11·3	..
	Class II.								
1	Diathetic Diseases..	28	1	..	1	5·7	·20	4·5	·11
2	Tubercular „ ..	44	5	1	6	8·9	1·22	10·5	1·86
	Class III. Diseases of the—								
1	Nervous System ..	71	2	1	3	14·4	·61	18·4	·53
2	Circulatory „ ..	75	9	..	9	15·2	1·83	7·6	·73
3	Respiratory „ ..	175	4	..	4	35·6	·81	46·0	·77
4	Digestive „ ..	217	7	..	7	44·1	1·42	46·9	·62
5	Urinary „ ..	11	1	..	1	2·2	·20	2·2	·22
6	Reproductive „ ..	81	..	..	..	16·5	..	12·3	..
7	Locomotive „ ..	22	..	..	..	4·5	..	5·0	..
8	Integumentary „ ..	561	..	..	..	114·1	..	128·8	·04
	Class IV. Diseases of Nutrition.	36	1	..	1	7·3	·20	5·0	·04
	Class V.								
1	Accidents	358	11	..	11	72·8	2·24	82·9	1·14
3	Homicide	..	..	..	..	..	..	..	·02
4	Suicide	1	5	..	5	·2	1·02	·2	·26
5	Execution	..	..	..	..	..	..	..	·04
6	Corporal Punishment	..	..	..	..	..	..	2·7	..
	No appreciable disease	2	..	..	..	·4	..	·2	..
	Diseases not stated ..	..	..	..	..	..	..	1·5	..
	Total	4,247	117	2	119	863·4	24·19	887·3	12·73

The admissions have been 24 per 1,000 under, but the deaths have been nearly double the average of the preceding eight years. Miasmatic diseases have been the cause of more than half the increase of mortality.

Miasmatic Diseases have been much more prevalent and fatal than usual in Malta. The admissions and deaths by the principal diseases in this class were as follows :—

Diseases.	1867.		Annual Ratio per 1,000 of Strength.			
			1867.		1859–66.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	4	..	·8	..	1·4	·09
Paroxysmal „	3	..	·6	..	4·6	·02
Continued „	1,125	39	228·7	7·93	182·3	3·42
Dysentery and Diarrhœa	339	7	68·9	1·42	70·6	·66
Spasmodic Cholera	27	22	5·5	4·47	2·6	1·89
Sorethroat and Influenza	75	..	15·3	..	14·9	..
Ophthalmia..	278	..	56·5	..	73·0	..
Rheumatism	244	..	49·6	..	49·5	·04

Continued Fevers were the cause of the excess of admissions by this class, compared with the results of previous years. They prevailed to a great extent from June to September inclusive, and proved very fatal. The greatest number of cases during the year occurred in the 1st Battalion 8th Regiment, quartered in the Lower St. Elmo Barracks; and next in frequency were the 64th at Forts Ricasoli and Salvatore and Zabbar Gate Barrack, the 1st Battalion 24th at Fort Verdala, and the 31st Regiment at Isola Gate, Polverista, and San Francisco. The following Table shows the cases of continued fevers, and the deaths by them in the different corps stationed in Malta during the four months in which this form of disease was so prevalent.

	Strength on 1st June.	Admissions and Deaths by Continued Fevers in								
		June.		July.		August.		September.		
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
Royal Engineers ...	182	5	...	10	...	5	...	2	...	St. Francis Barracks and Ravelin.
1st Batt. 8th Regt.	703	30	1	45	1	58	8	24	...	Lower St. Elmo.
2nd „ „	677	10	...	11	1	6	1	6	...	Floriana.
1st „ 24th „	658	39	...	36	...	34	1	28	...	Fort Verdala.
31st Regiment ...	679	2*	...	42	1	18	1	20	1	Isola Gate, Polverista, and San Francisco.
64th „ ...	620	63	...	69	...	29	1	25	2	Fort Ricasoli and Salvatore.

* Did not arrive till 20th June.

It will be seen that the Royal Engineers in St. Francis Barracks and Ravelin, and the 2nd Battalion 8th Regiment in Floriana Barracks enjoyed a marked exemption; while Forts Ricasoli and Salvatore furnished the largest number of cases, and Lower St. Elmo Barracks of deaths. The disease continued to prevail in Lower St. Elmo till the end of the year, after it had ceased in the other barracks.

Dysentery and Diarrhœa were more prevalent than in 1866. The 64th and 1st Battalion 8th Regiments, the corps in which, as we have seen, fevers were most prevalent, furnished the largest number of cases.

Spasmodic Cholera prevailed to a great extent in the early part of summer in Sicily and Turin. In the beginning of July two women from the latter place and the captain of an Italian vessel died of it in the Lazaretto at Malta. About the same date there were a number of cases of choleraic diarrhœa among the civil population in some of the villages, and one severe case was reported in the 64th Regiment at Zabbar Gate Barracks. No further case of cholera occurred till the 23rd of August, when a woman residing

Malta. in Valetta was attacked and died after 73 hours' illness; and several cases of choleraic diarrhœa, some of which proved fatal, were reported among the civil population.

On the 30th of August, the 1st Battalion 14th Foot arrived at Malta from Ireland, and six companies were immediately sent to Pembroke Camp, getting thoroughly drenched by a storm on the line of march. The same night a fatal case of cholera occurred at the camp in the wife of a private of the 1st Battalion 60th; a woman who in consequence of her bad character had been struck off the strength of the Regiment. On the 2nd of September, a man of the 14th was attacked, and died in 9½ hours; at the same time several cases of choleraic diarrhœa occurred in the 60th, and two in the 14th, but all recovered. On the 4th the child of a serjeant, Royal Engineers, was attacked, and died in 8 hours; and on the 5th, a man of the 14th, who died the same afternoon. On the morning of that day the 1st Battalion 60th Regiment embarked for Canada; one fatal case of cholera and 14 cases of diarrhœa, two of which died, occurred in it on the voyage. On the 6th of September, four more cases having occurred in the 14th Regiment, it was moved out of barracks and encamped on the musketry range. For the next two days there were no fresh cases, but on the 9th two men were sent to hospital who died the same day. On the 10th a child, and on the 11th two men of the 14th died of the disease. On the 14th September, the detachment at Pembroke Camp, with the exception of the married people, was moved to the Island of Gozo. Before its removal one man was sent to hospital, and died the following day; and on the 16th and 17th two women of the Regiment, who had been left behind, died. On the 18th a child which had been too ill to be moved to Gozo, and on the 19th a serjeant of Royal Engineers, the death of whose child has been already recorded, died at Pembroke Camp, being the last cases which occurred there.

During the progress of the disease at Pembroke Camp, a fatal case of choleraic diarrhœa occurred at Valetta, in a man of the Royal Artillery on the 11th of September; a man of the 1st Battalion 8th Regiment, encamped at Floriana, died of cholera on the 17th; and a man of the Head-Quarters 14th Regiment at Fort Manoel on the 18th. On the 26th, a private of the 1st Battalion 8th Regiment at Floriana died, and on the 29th the wife of a gunner R.A. at Fort Salvatore.

In October, 8 men were attacked, of whom 5 died; 3 women, of whom 1 died; and 3 children, of whom 2 died. Two fatal cases subsequently occurred in the 10th Brigade Royal Artillery on the 18th and 20th of November.

There were in all 22 deaths among the men from cholera, and 6 from choleraic diarrhœa; all the latter occurred in September: of the former, 15 were in September, 5 in October, and 2 in November. Among the women, the average number of whom was 551, there were six cases of cholera and 4 deaths; and among 880 children, 4 cases and 4 deaths.

Ophthalmia was rather more prevalent than in 1866, though the admissions were greatly under the average of the last eight years. The corps which furnished much the largest proportion of cases was the 2nd Battalion 8th Regiment. The admissions from the 1st Battalion were also considerably above the average: but the Surgeon states that many of them were men transferred from the 2nd Battalion "while suffering from the disease." The Surgeon of the latter Battalion attributes the increase of cases to the defective ventilation of Floriana Barracks, and to the effect of the great heat and glare, and the amount of dust floating in the air during the hot weather.

Diseases of the Circulatory System maintained the high proportion which was noted in 1866, though the mortality was lower than in that year.

Accidental and Violent Deaths were much above the average. Three men were accidentally drowned; six died from fracture, two of whom sustained the injury by falling out of windows; and five committed suicide with their rifles.

Royal Malta Fencible Artillery.

The average strength of this corps for the year was 595 non-commissioned officers and men; the admissions into hospital were 374, and the deaths 3,

being in the ratio of 629 and 5·04 per 1,000 of the strength, and considerably under the results for 1866.

The admissions and deaths by the various diseases are stated in Abstract No. 10 in Appendix. The classified results are shown in the following Table :—

Orders.	Diseases.	Royal Malta Fencible Artillery. Average Strength. 595 Admitted.	Died.	Annual Ratio per 1,000. 1867. Admitted.	Died.	1859–66. Admitted.	Died.	Annual Ratio per 1,000 of Strength. Line Regiments at Malta. 1867. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases	142	1	238·7	1·68	286·8	2·09	439·9	13·83
2	Enthetic „	35	..	58·8	..	63·5	..	54·5	..
3	Dietic „	..	..	..	..	·6	..	22·2	·61
4	Parasitic „	..	..	..	..	3·1	..	4·9	..
	Class II.								
1	Diathetic Diseases	1	..	1·7	..	2·5	·21	5·7	·20
2	Tubercular „	4	..	6·7	..	3·8	1·67	8·9	1·22
	Class III. Diseases of the—								
1	Nervous System	7	1	11·8	1·68	13·4	·84	14·4	·61
2	Circulatory „	..	..	..	..	2·9	·84	15·2	1·83
3	Respiratory „	35	..	58·8	..	75·7	·42	35·6	·81
4	Digestive „	50	1	84·0	1·68	165·3	1·25	44·1	1·42
5	Urinary „	2	..	3·4	..	1·5	..	2·2	·20
6	Reproductive „	1	..	1·7	..	2·5	..	16·5	..
7	Locomotive „	..	..	..	..	..	..	4·5	..
8	Integumentary „	66	..	110·9	..	138·5	..	114·1	..
	Class IV.								
4	Diseases of Nutrition ..	..	..	..	..	..	..	7·3	·20
	Class V.								
1	Accidents	31	..	52·1	..	84·9	1·05	72·8	2·24
3	Homicide	..	..	..	..	·2	·42	..	..
4	Suicide	..	..	..	..	·4	..	·2	1·02
6	Corporal Punishment ..	..	..	..	..	·8	..	..	..
	No appreciable disease ..	..	..	..	..	..	..	·4	..
	Total	374	3	628·6	5·04	846·4	8·79	863·4	24·19

The admissions and deaths have been considerably under the average of the preceding eight years, and the mortality has been little more than one-fifth of that of the Line Regiments in 1867. The latter circumstance is chiefly due to the Malta Fencible Corps having escaped the epidemics of cholera and of fever, which proved so fatal to the other troops.

MIASMATIC DISEASES are much less prevalent than in 1866, the difference being in the cases of *ophthalmia* which, though still considerably above the proportion in the Line Regiments, did not amount to half the number admitted in that year.

DISEASES OF THE RESPIRATORY AND DIGESTIVE SYSTEMS were the causes of a much higher ratio of admissions than in the Line, bronchitis and dyspepsia

Malta. being the principal forms of disease. The proportion of cases of abscesses and ulcers was also unusually high.

No death occurred during the year from accidents or violence.

SANITARY REPORT.

Inspector-General Paynter says, in reference to the opinions of the different Medical Officers, stated in the several Regimental Sanitary Reports rendered from corps serving in this Command for the year 1867, that he is disposed to consider that drinking to excess has been a fertile cause of disease.

The following are the causes of diseases of the zymotic class, referred to in the different Regimental Reports, viz. :—

Insufficient water supply for all purposes. (This insufficiency is being remedied.)

Badly constructed and ill-ventilated barrack-rooms.

Badly constructed latrines and urinals, with their sewerage and drainage.

Dampness of rooms in winter, without the means of warming and drying them.

Insufficient lavatory and bath accommodation.

Insufficient means for cooking the food in a satisfactory manner.

The badly selected sites on which barracks are built, and insanitary condition of the vicinities of barracks : guard-rooms, and cells, in several instances, are stated to be too small, with insufficient light and ventilation.

Such are some of the most prominent causes to which we may attribute attacks of disease, and where so many really exist, it is very difficult to select any one, or even two, as being the most evident. With the exception of St. Francis' barrack-rooms at Floriana, and Pembroke Camp barrack-rooms, all the others are ill-constructed, dark, gloomy, damp, ill-ventilated places. Every barrack-room should have a fireplace, with an allowance of fuel granted during the winter months.

Wooden huts should not be used as dwellings ; they are too hot in summer, and too cold and damp in winter.

More accommodation for married families is required in some parts of the Command.

Many of the guard-rooms and cells require attention as regards size, light, and ventilation.

Properly constructed latrines and urinals, with continuous flushing pipes fixed to the latter, are required in many of the barracks, with sewerage, &c., leading from them. Care should be taken, in re-constructing these places, to select situations for them as far as possible from tanks, wells, &c.

Improvement in barrack kitchens is required in many of the barracks.

Proper ablution and bath-rooms are required in many of the barracks.

Satisfactory hospital accommodation for the sick in this Command is a prominent want.

Section II.

On the Extent of Invaliding among the Troops serving in the Mediterranean.

Mediterranean. There were 221 invalids sent to England from the Mediterranean, and 143 finally discharged the service at Netley during the year, being, respectively, in the proportion of 23·3 and 15·1 per 1,000 of the mean strength. The former is somewhat higher and the latter lower than in 1866. The following classified summary of the disabilities of the invalids, has been framed from Abstract No. 11 in Appendix.

Mediterranean.

	Invalids sent home from			Invalids discharged at Netley from		
	Gibraltar.	Malta.	Total.	Gibraltar.	Malta.	Total.
Continued Fevers	..	5	5	..	2	2
Dysentery and Diarrhœa	..	1	1	..	1	1
Ophthalmia	4	2	6	7	1	8
Rheumatism	3	2	5	1	4	5
Venereal Diseases	1	3	4	2	3	5
Diatic „	..	2	2	..	..	..
Diathetic „	2	3	5	1	1	2
Tubercular „	32	19	51	27	21	48
Diseases of the—						
Nervous System	13	17	30	4	5	9
Circulatory „	12	25	37	13	12	25
Respiratory „	9	11	20	2	3	5
Digestive „	1	22	23	2	10	12
Urinary „	1	3	4	2	3	5
Reproductive „	..	..	..	..	..	..
Locomotive „	3	2	5	2	4	6
Integumentary „	4	2	6	2	1	3
Diseases of Nutrition	2	9	11	1	..	1
Accidents and Violence..	2	4	6	4	2	6
Total	89	132	221	70	73	143
Ratio per 1,000 of Mean Strength { 1867	19·5	26·8	23·3	15·4	14·8	15·1
Ratio per 1,000 of Mean Strength { 1859–66	26·9	18·7	22·6	20·2	14·1	17·0

As regards the numbers sent home as invalids, the general results for the Mediterranean closely approximate the average of the preceding eight years, though there has been a decrease from Gibraltar, and an increase from Malta. There has been a reduction in the numbers finally discharged the service of the invalids from Gibraltar; while the proportion of those from Malta slightly exceeds the average.

TUBERCULAR DISEASES have been the chief cause of invaliding and discharge, and diseases of the circulatory system rank next. The number of men sent to England for the latter has been much greater from Malta than from Gibraltar, but the number finally discharged the service has been nearly the same from each of those commands. The invaliding on account of ophthalmia has been much less than in previous years.

Section III.

Mean Daily Sick.

The mean daily sick in Gibraltar amounted to 159, and in Malta to 230, being in the ratio of 34·91 and 46·76 per 1,000 of mean strength. The following Table gives the usual information on this head.

Mediterranean.

	Gibraltar.	Malta, exclusive of Royal Malta Fencibles.	United Kingdom. Infantry Regiments. Average of eight years, 1860–67.
Average Strength in 1867 ..	4,555	4,919	
Average constantly sick in 1867..	159	230	
Ratio per 1,000 constantly sick { 1867 ..	34·91	46·76	42·86
Ratio per 1,000 constantly sick { 1859–66..	40·46	46·29	
	days	days	days
Average sick time to each Soldier { 1867 ..	12·74	17·07	15·66
Average sick time to each Soldier { 1859–66..	14·77	16·90	
Average duration of the cases of disease { 1867 ..	17·94	19·77	19·14
Average duration of the cases of disease { 1859–66..	18·56	19·04	

At Gibraltar the mean daily sick, and the average sick time to each soldier were slightly in excess of the results for 1866, but considerably under the average of the eight years, while the reverse was the case at Malta, being a little lower than in 1866 but above the average. There has been a slight decrease in the duration of the cases at Gibraltar, and increase at Malta; the latter probably owing to the tedious convalescence of the fever cases.

Section IV.

On the Influence of Age on the Mortality.

The following Table shows the influence of age on the mortality of the troops serving in the Mediterranean Commands, founded on the returns of those corps only which were there during the whole year. The details by corps will be found in Abstract No. 12 in Appendix.

	Ratio of Deaths per 1,000 of Strength at each period of life.					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Mediterranean Commands { 1867	2·51	13·00	13·39	21·40	30·61	37·04
Mediterranean Commands { 1859-66	6·28	6·70	12·31	13·94	23·59	25·39

The marked increase in the ratio at the ages of 20 and under 25 was chiefly due to deaths from continued fever at Malta.

In the results for the preceding eight years, the break in the progressive increase in the mortality at 30 and under 35, the age at which re-engagement for a second period of service usually occurs, is very marked.

III.—ON THE HEALTH OF THE TROOPS SERVING IN BRITISH AMERICA.

Section I.—*Sickness and Mortality.*

I.—Canada.

STATISTICAL REPORT.

Canada.

In the end of July the 3rd Brigade Royal Artillery and 29th Regiment arrived in Canada from Malta, and the 78th Regiment from Gibraltar; in the beginning of October the 69th arrived from Dublin, and in the middle of November the 1st Battalion 60th from Malta. These corps relieved the 10th Brigade Royal Artillery, which proceeded to Malta, and the 2nd Battalion 7th, 1st Battalion 25th, 4th Battalion Rifle Brigade, and 2nd Battalion 23rd Regiment, which all returned to England.

The average strength of the troops for the year was 11,240; the admissions into hospital were 8,198, and the deaths 111, of which 70 occurred in hospital, 36 out of hospital, and 5 among the invalids on their passage home and at Netley. The ratio of admissions therefore was 729, and of deaths 9·87 per 1,000 of mean strength; the former being slightly above, and the latter under the ratio of the preceding year.

The following Table shows the amount of admissions and deaths in each corps serving in the Command during the year:—

	Annual Average Strength.	Admitted into Hospital.	Deaths.				Annual ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
13th Hussars ..	467	315	..	2	..	2	674·5	4·28
Royal Artillery ..	1,670	1,393	12	9	1	22	834·1	13·17
Royal Engineers ..	169	144	1	..	..	1	852·1	5·92
2nd Batt. 7th Regt...	430	369	1	2	..	3	858·1	6·98
1st „ 16th „ ..	680	505	4	..	..	4	742·6	5·88
2nd „ 17th „ ..	699	423	3	2	..	5	605·1	7·15
2nd „ 23rd „ ..	594	317	6	..	..	6	500·8	9·48
1st „ 25th „ ..	446	402	3	..	..	3	901·3	6·73
29th Regiment ..	305	252	1	..	..	1	826·2	3·28
30th „ ..	735	399	1	4	..	5	542·9	6·80
53rd „ ..	708	637	5	1	..	6	899·7	8·47
1st Batt. 60th Regt. ..	185	221	..	..	..	..	1194·6	..
4th „ „ „ ..	728	328	5	2	..	7	450·5	9·62
69th Regiment ..	210	242	1	..	..	1	1152·4	4·76
78th „ ..	351	252	3	..	..	3	717·9	8·55
100th Regiment ..	709	515	10	5	..	15	726·4	21·16
1st Batt. Rifle Brig...	720	576	2	1	..	3	800·0	4·17
4th „ „ „	468	287	5	1	1	7	613·2	14·96
Royal Canadian Rifles	1,073	593	6	5	3	14	552·7	13·05

The three other deaths were men of the Commissariat Staff Corps.

Canada. The admissions were much above the average in the 69th Regiment, which arrived from Ireland in the beginning of October, and in the 1st Battalion 60th from Malta on the 20th of November. In the former venereal diseases, and in the latter bronchitis and, though to a less extent, venereal diseases, were the causes of the excess. The mortality was more than double the average in the 100th Regiment, which was in the Command during the whole year, but one-third of the deaths were the result of violence.

The following Table, framed from Abstract No. 13 in Appendix and previous reports, shows the influence of the different classes of diseases on the sickness and mortality :—

Orders.	Diseases.	Strength, 11,240.				Annual Ratio per 1,000.			
			Deaths.			1867.		1859-66.	
		Admissions.	In Canada.	Of Invalids.	Total.	Admissions.	Deaths.	Admissions.	Died.
	Class I.								
1	Miasmatic Diseases ..	1,696	18	..	18	150·9	1·60	130·4	1·12
2	Enthetic „	2,058	..	..	..	183·1	..	160·9	·05
3	Dietic „	231	..	..	..	20·5	..	19·7	·21
4	Parasitic „	85	..	..	..	7·6	..	7·6	..
	Class II.								
1	Diathetic Diseases	57	1	..	1	5·1	·09	2·8	·03
2	Tubercular „	113	15	1	16	10·0	1·42	8·3	1·67
	Class III. Diseases of the								
1	Nervous System	224	12	..	12	19·9	1·07	15·5	1·03
2	Circulatory „	61	14	2	16	5·4	1·42	4·4	1·19
3	Respiratory „	883	13	1	14	78·6	1·24	68·1	1·43
4	Digestive „	337	8	..	8	30·0	·71	37·0	·40
5	Urinary „	17	1	..	1	1·5	·09	2·1	·16
6	Reproductive „	70	..	..	..	6·2	..	7·2	..
7	Locomotive „	31	..	..	..	2·8	..	3·2	·03
8	Integumentary „	1,142	..	..	..	101·6	..	97·5	·05
	Class IV.								
1	Diseases of Nutrition ..	44	..	..	..	3·9	..	1·1	..
	Class V.								
1	Accidents	1,109	18	1	19	98·7	1·69	102·3	2·02
3	Homicide	..	2	..	2	..	·18	..	·09
4	Suicide	..	4	..	4	..	·36	·1	·28
5	Execution	..	..	..	..	..	..	..	·03
6	Corporal Punishment ..	13	..	..	..	1·2	..	1·8	..
	No appreciable disease ..	27	..	..	..	2·4	..	·4	..
	Diseases not specified ..	..	..	..	..	..	..	·4	..
	Total	8,198	106	5	111	729·4	9·87	670·8	9·79

The admissions have been about 60 per 1,000 of the strength above the average of the preceding eight years, but the ratio of deaths for the two periods very closely corresponds. The increase has been chiefly in miasmatic and venereal diseases, and in those of the respiratory system.

Miasmatic Diseases when subdivided give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1867.		1859-66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	32	..	2·8	..	4·2	·10
Paroxysmal „	74	..	6·6	..	5·5	·09
Continued „	185	11	16·5	·98	17·2	·61
Dysentery, Diarrhœa, and Cholera ..	266	2	23·7	·18	25·0	·10
Sorethroat and Influenza	385	1	34·2	·09	27·9	..
Ophthalmia	190	..	16·9	..	14·8	..
Rheumatism	443	3	39·4	·26	26·7	·05

Rheumatism and Sorethroat (tonsillitis) were the only diseases which furnished a marked increase, compared with the average of the preceding eight years. Of the former, the 100th Regiment furnished much the largest number of cases. The Surgeon of the Regiment attributes this to the circumstance of most of the men having, during their previous service in Malta, suffered from the form of fever prevalent there, which is so often followed by attacks of rheumatism, and thus acquired a susceptibility to that disease. *Sorethroat* was very frequent in the 53rd Regiment, but no special cause is assigned for this beyond the sudden changes of temperature, and the carelessness of the men in exposing themselves.

Enthetic Diseases were considerably more prevalent than in 1866, and were 22 per 1,000 above the average of the eight years. The excess has been chiefly in cases of primary venereal sores.

Accidental and Violent Deaths.—Drowning, as usual, caused a large proportion of the deaths by this class, 15 out of 18 accidental deaths having been attributed to it.

SANITARY REPORT.

The state of health of the troops in this Command has been very satisfactory during the year under notice. As cholera had prevailed during the summer of 1866 in several of the large towns of the United States, it was apprehended that it might appear during the following summer in Canada, and Inspector-General McIllree accordingly directed the attention of medical officers to the necessity of a vigilant supervision of all sanitary matters. Only one case, however, and that a doubtful one, occurred in the person of a soldier of the 4th Battalion of the 60th Rifles at London, Canada West.

Dr. McIllree reports that the barrack accommodation on the whole has been satisfactory. The majority of the buildings being hired are doubtless, in many instances, capable of improvement in a sanitary point of view, but so long as the health of the men is satisfactory, the expenditure of public money upon hired property is not, in his opinion, called for. There has been no difficulty in obtaining the regulated amount of cubic space in the several barracks, except in a few cases for a short time during winter; and from the reports of the medical officers in charge it does not appear that disease has been traceable to sanitary defects in the quarters under occupation.

The hospital accommodation is, with the exception of the consolidated hospital at Montreal, satisfactory. In the latter instance, during the last part of 1867, there was some difficulty experienced, and it was found necessary to appropriate a ward for the treatment of infectious diseases.

II. Nova Scotia and New Brunswick.

STATISTICAL REPORT.

Nova Scotia and New Brunswick.

During the year a battery of Royal Artillery exchanged stations with a battery in Canada; two batteries of the 1st Brigade R.A. from Gibraltar relieved two of the 15th, which proceeded to that Command, and two companies of Royal Engineers embarked for Bermuda on being relieved by two companies from that station.

The average strength of the troops during the year amounted to 3,387, among whom there were 1,658 admissions into hospital and 21 deaths, of which 8 occurred out of hospital; there were also 5 deaths among the invalids at Netley, making the total 26. These numbers give the proportion of 489 admissions, and 7·68 deaths per 1,000 of mean strength, being almost identical with the results for 1866.

The following Table shows the proportion of sickness and mortality in each corps:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	438	264	3	1	..	4	602·7	9·13
Royal Engineers . ..	193	100	1	..	1	2	518·1	10·36
2nd Batt. 4th Regiment.	692	323	2	1	1	4	466·8	5·78
1st „ 15th „	671	341	3	6	1	10	508·2	14·90
1st „ 22nd „	720	253	3	..	1	4	351·4	5·55
47th Regiment	671	377	1	..	1	2	561·8	2·98

The ratio of deaths was very high in the 1st Battalion 15th Regiment, but four of them were by accidental drowning.

The following Table shows the admissions and deaths by each class of diseases. The details for 1867 will be found in Abstract No. 13 in Appendix:—

Nova Scotia and New Brunswick.

Orders.	Diseases.	1867. Mean Strength, 3,387. Admissions.	Deaths. In Nova Scotia.	Deaths. Of Invalids.	Deaths. Total.	1867. Annual Ratio per 1,000 of Strength. Admitted.	Died.	1859–66. Annual Ratio per 1,000 of Strength. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	347	..	..	..	102·4	..	128·6	·87
2	Enthetic ,, ..	315	..	..	..	93·0	..	123·1	..
3	Dietic ,, ..	53	1	..	1	15·6	·30	14·8	·43
4	Parasitic ,, ..	10	..	..	..	2·9	..	10·7	..
	Class II.								
1	Diathetic Diseases ..	5	..	..	..	1·5	..	1·4	·10
2	Tubercular ,, ..	44	1	3	4	13·0	1·18	10·0	1·59
	Class III. Diseases of the—								
1	Nervous System ..	51	3	..	3	15·0	·88	13·4	·77
2	Circulatory ,, ..	13	4	1	5	3·8	1·47	3·2	·91
3	Respiratory ,, ..	191	4	..	4	56·4	1·18	48·9	·96
4	Digestive ,, ..	98	1	..	1	27·4	·30	26·9	·43
5	Urinary ,, ..	9	1	..	1	2·6	·30	1·6	..
6	Reproductive ,, ..	21	..	..	..	6·2	..	4·5	..
7	Locomotive ,, ..	7	..	1	1	2·0	·30	2·1	..
8	Integumentary ,, ..	206	..	..	..	60·8	..	81·7	..
	Class IV.								
4	Diseases of Nutrition ..	6	..	..	..	1·8	..	·7	..
	Class V.								
1	Accidents	281	5	..	5	83·0	1·47	85·8	1·15
3	Homicide	1	1	..	1	·3	·30	..	·10
4	Suicide	1	..	..	..	·3	..	..	·14
6	Corporal Punishment ..	4	..	..	..	1·5	..	2·7	..
	Diseases not stated ..	..	..	..	..	..	..	1·0	..
	Total	1,658	21	5	26	489·5	7·68	561·1	7·45

The admissions have been considerably under the average of the preceding eight years; the decrease being chiefly in miasmatic and venereal diseases and those of the integumentary system. A comparison with the results for 1866 shows a considerable reduction in miasmatic diseases, and, though to a less extent, in diseases of the integumentary system, but this has been nearly counterbalanced by an increase in diseases of the respiratory and digestive systems.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases in this class were as follows:—

Nova Scotia and New Brunswick.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1859-66. Admitted.	1859-66. Died.
Eruptive Fevers	4	..	1·4	..	1·0	·05
Paroxysmal „	3	..	·9	..	1·3	..
Continued „	38	..	11·2	..	12·6	·62
Dysentery, Diarrhœa, and Cholera ..	36	..	10·6	..	13·5	·05
Sorethroat and Influenza	73	..	21·5	..	41·0	..
Ophthalmia	90	..	26·5	..	22·7	..
Rheumatism	76	..	22·4	..	26·5	..

The admissions for *Sorethroat* (tonsillitis) *and Influenza* were 10 per 1,000 less than in 1866, and amounted to only half the average of the last eight years.

Ophthalmia was considerably less prevalent than in 1866, although still above the average of the eight years. The excess of cases came from the 1st Battalions 15th and 22nd Regiments. In both these corps ophthalmia has prevailed for some years; but the cases, especially in the 22nd, show a gradual reduction.

The other diseases in this class so nearly approximate the average as to require no remark.

ENTHETIC DISEASES although much under the average, were a trifle in excess of the proportion in 1866.

DISEASES OF THE RESPIRATORY SYSTEM were considerably more prevalent than in 1866, and were also above the average of the last eight years. This was chiefly due to the occurrence of an epidemic of pneumonia in the 1st Battalion 22nd Regiment; of 73 cases, 51 occurred in that corps, 12 in January, 20 in February, 11 in March, and the other eight cases during the remaining months; two only terminated fatally. The disease was attributed by the medical officers chiefly to the defective accommodation afforded by the Exhibition building which was occupied as a temporary barrack. This view is supported by the circumstance that 38 of the cases occurred among 330 men occupying that quarter, while the rest of the corps, amounting to 322 men in permanent barracks or in lodgings furnished only 13 cases. A detailed report upon the nature and causes of this epidemic by Assistant-Surgeon Welch will be found at page 329, of this volume.

ACCIDENTAL AND VIOLENT DEATHS.—Four of the five accidental deaths were by drowning. The homicidal death was that of a private of the 47th Regiment, who had his skull fractured in a street fight. There was no death by suicide during the year.

SANITARY REPORT.

Deputy Inspector-General Chambers reports:—The defective sanitary condition of the towns of Fredericton and St. John, New Brunswick, and St. John's, Newfoundland, still remains unimproved to any extent, some minor alterations having only been projected.

Dr. Chambers, in his Sanitary Report, enumerates, substantially, the same defects, which have been referred to in previous Reports.

The sanitary improvements and alterations effected during the past year have been as follows:—

St. John's, New Brunswick.—Ventilation of barracks and lock-up room generally improved; new latrine and urinal at officers' quarters.

Fredericton.—Porticos at each door of Exhibition Building (temporary barracks), and a covered way to the latrines and urinals have been constructed. The building has also been "banked" all round, to a height of 6 feet, with sawdust, which is packed between the outer and inner walls. *Nova Scotia and New Brunswick.*

The ventilation of the Stone and Park Barracks has been much improved by means of outlet shafts and inlets. The lock-up and guard-room in the former barracks have also been much improved in this respect.

III.—Newfoundland.

In the beginning of August the 1st Battery 3rd Brigade Royal Artillery from Malta, relieved the 8th Battery 10th Brigade. These, with a detachment of the Royal Canadian Rifle Regiment, formed the garrison during the year. *Newfoundland.*

The average strength of non-commissioned officers and men was 280; the admissions into hospital amounted to 133, and the deaths to 5, of which 3 occurred out of hospital. All the deaths were in the Rifles. The admissions were in the ratio of 475, and the deaths of 17·85 per 1,000 of the strength; both considerably higher than in 1866, and the latter more than double the average of the last eight years.

The following Table shows the influence of the different classes of diseases in causing sickness and mortality. The details will be found in Abstract No. 13 in Appendix :—

Orders.	Diseases.	Strength, 280.				Annual Ratio per 1,000.			
			Deaths.			1867.		1859-66.	
		Admissions.	In Newfoundland.	Of Invalids.	Total.	Admissions.	Deaths.	Admissions.	Deaths.
	Class I.								
1	Miasmatic Diseases	26	..	..	..	92·9	..	203·5	..
2	Enthetic „	10	..	..	..	35·7	..	40·4	..
3	Dietic „	20	..	..	..	71·4	..	30·9	·47
4	Parasitic „	2	..	..	..	7·1	..	3·8	..
	Class II.								
1	Diathetic Diseases	..	..	..	..	..	..	3·3	..
2	Tubercular „	2	2	..	2	7·1	7·14	11·9	1·90
	Class III. Diseases of the—								
1	Nervous System	1	..	..	..	3·6	..	35·7	1·43
2	Circulatory „	..	1	..	1	..	3·57	11·9	1·43
3	Respiratory „	20	..	..	..	71·4	..	78·4	2·38
4	Digestive „	8	..	..	..	28·6	..	35·2	..
5	Urinary „	1	..	..	..	3·6	..	2·4	·47
6	Reproductive „	..	..	..	..	..	..	4·3	..
7	Locomotive „	..	..	..	..	..	..	5·7	..
8	Integumentary „	22	..	..	..	78·6	..	48·0	..
	Class IV.								
4	Diseases of Nutrition	2	..	..	..	7·1	..	..	..
	Class V.								
1	Accidents	19	1	..	1	67·9	3·57	105·1	·95
4	Suicide	..	1	..	1	..	3·57	..	..
6	Corporal Punishment	..	..	..	..	..	..	2·4	..
	Diseases not stated	..	..	..	..	..	..	2·4	..
	Total	133	5	..	5	475·0	17·85	625·3	9·03

Newfoundland. Compared with the results for 1866 there has been a considerable increase in miasmatic and dietic diseases, and in those of the integumentary system, but a decrease in venereal diseases; when the numbers are so small, however, considerable fluctuations may be expected. The most notable increase has been in dietic diseases, from the admission of 20 cases of intemperance (*ebriositas*), all of them from the detachment of Royal Canadian Rifles. The very low ratio of venereal diseases is due to the greater number of the men composing that detachment being married. The increase in the proportion of diseases of the integumentary system was due to the occurrence of several cases of boils (*phlegmon*) and abscess in the men of the Royal Artillery.

The death rate was high, all the deaths occurred in the detachment of the Rifles. One man died suddenly from heart disease, one was found frozen to death near the barracks, two died of consumption, and one committed suicide by drowning himself in the harbour.

IV. Bermuda.

STATISTICAL REPORT.

Bermuda.

In the middle of February two batteries 1st Brigade Royal Artillery from Gibraltar relieved two of the 15th Brigade, and in May two Companies of Royal Engineers were relieved by two from Nova Scotia. One Company R.E. and the 61st Regiment served in the Command during the whole year.

The average strength of the troops amounted to 1,249, the admissions into hospital to 923, the deaths in hospital to 16, out of it to 5, and among the invalids to 1, making a total of 22. The ratio of admissions therefore was 739, and of deaths 17·61 per 1,000 of the strength, both considerably lower than in 1866.

The admissions and deaths by the different classes of diseases are shown in the following Table. The details are given in Abstract No. 13 in Appendix:—

Order	Diseases.	1867. Mean Strength, 1,249. Admissions.	Deaths. In Bermuda.	Deaths. Of Invalids.	Deaths. Total.	1867. Annual Ratio per 1,000 of Strength. Admissions.	Deaths.	1859-66. Annual Ratio per 1,000 of Strength. Admissions.	Deaths.
	Class I.								
1	Miasmatic Diseases	262	9	..	9	209·8	7·21	250·6	21·70
2	Enthetic „	74	..	..	..	59·2	..	66·7	..
3	Dietic „	41	1	..	1	32·8	·80	35·1	·22
4	Parasitic „	5	..	..	..	4·0	..	4·9	..
	Class II.								
1	Diathetic Diseases	6	..	..	..	4·8	..	4·5	·11
2	Tubercular „	14	..	1	1	11·2	·80	13·1	2·79
	Class III. Diseases of the—								
1	Nervous System	46	3	..	3	36·9	2·40	29·9	3·13
2	Circulatory „	13	..	..	..	10·4	..	5·6	1·12
3	Respiratory „	48	1	..	1	38·4	·80	41·8	·56
4	Digestive „	81	1	..	1	64·8	·80	50·7	·89
5	Urinary „	1	..	..	..	·8	..	1·3	..
6	Reproductive „	13	..	..	..	10·4	..	9·9	..
7	Locomotive „	4	..	..	..	3·2	..	3·5	..
8	Integumentary „	159	..	..	..	127·3	..	100·0	..
	Class IV.								
4	Diseases of Nutrition ..	9	..	..	..	7·2	..	3·8	..
	Class V.								
1	Accidents	146	4	..	4	116·9	3·20	92·9	1·68
4	Suicide	1	2	..	2	·8	1·60	..	·67
6	Corporal Punishment ..	..	..	..	..	..	..	3·0	..
	Diseases not specified ..	..	..	..	..	..	..	1·2	..
	No appreciable disease ..	..	..	..	..	..	..	·3	..
	Total..	923	21	1	22	738·9	17·61	718·8	32·87

Bermuda. The admissions have been a little above the average, the excess being chiefly due to accidents and diseases of the integumentary system. The deaths have not been much more than half the average, the reduction being in those of the miasmatic class.

MIASMATIC DISEASES were much less prevalent than usual, and the mortality by them was only one-third of the average. The admissions and deaths by the principal diseases of this class were as follows:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1867. Admitted.	1867. Died.	1859-66. Admitted.	1859-66. Died.
Paroxysmal Fevers	1	..	·8	..	2·9	·11
Continued „	40	5	32·0	4·00	69·6	1·68
Yellow Fever	4	3	3·2	2·40	55·4	19·57
Dysentery, Diarrhœa, and Cholera	85	..	68·1	..	53·3	·33
Sorethroat and Influenza.. ..	52	1	41·6	·80	14·2	..
Ophthalmia	31	..	24·8	..	25·5	..
Rheumatism	45	..	36·0	..	24·1	..

Continued Fevers furnished less than half the average proportion of cases. The deaths were more than double the average, but were less than half the proportion which occurred in 1866. During the summer months a portion of the Force was encamped to give increased space in barracks during the hot weather, and to this the decrease in the amount of fever may, perhaps, have been to some extent due.

Yellow Fever.—Four cases of this disease were admitted into hospital, and three of them terminated fatally. They all occurred in the Royal Artillery. The first case was admitted into hospital on the 4th of October, and died on the 8th; the second was admitted on the 5th, and died on the 10th; the third was admitted on the 7th, and died on the 12th. The fourth case was that of an orderly in the hospital who had been in attendance on the other cases, was attacked on the 12th, and recovered. As soon as it was clearly ascertained that the first case was yellow fever, and not merely a severe case of remittent, steps were taken to remove the troops from St. George's. Accordingly, on the 11th October, the Royal Artillery encamped at Castle Island, the Royal Engineers at Tucker's Point, and the 61st Regiment at Ferry Point, where they remained for six weeks. After the move no case occurred except that of the orderly left at the hospital, and the men during the period of their being encamped enjoyed excellent health. No satisfactory explanation could be given of the cause of this sudden outbreak of yellow fever, confined as it was to the Royal Artillery.

Dysentery and Diarrhœa although above the average of the preceding eight years, were very much less prevalent than in 1866. The 61st Regiment furnished a larger proportion of cases than the Ordnance corps.

Sorethroat and Influenza were three times the average of the preceding eight years, from the prevalence of the latter during the first half of the year. It caused one death among the Royal Engineers.

ENTHETIC DISEASES which had increased in the two preceding years, have fallen below the average. The reduction has taken place in cases of primary venereal sores and of bubo.

DISEASES OF THE DIGESTIVE SYSTEM have been considerably above the average, chiefly from the admission of a large number of cases of dyspepsia in the 61st Regiment.

DISEASES OF THE INTEGUMENTARY SYSTEM have also been in excess. One

half of the admissions by this class were cases of boils (*phlegmon*) in the 61st Regiment. *British America.*

ACCIDENTAL AND VIOLENT DEATHS constituted upwards of one fourth of the whole mortality. Four were accidental and two suicidal.

SANITARY REPORT.

Surgeon-Major Evans, the Principal Medical Officer, reports that the health of the troops has been good during the year, and no disease is supposed to have arisen from any local cause, except three cases of yellow fever which occurred in the Royal Artillery in the month of October, and which not being traceable to importation, were supposed to have been caused by noxious exhalations from the military cemetery which is close to the forts where this corps was then quartered, some in the forts and some in tents on the glacis of the forts.

This grave-yard has been since thickly strewed with quicklime and is now finally closed, it being considered unadvisable to continue to inter the dead so close to Forts Victoria and Albert, the Royal Barracks, and the Garrison Hospital.

The whole of the troops were moved away from the vicinity of St. George's at the outbreak of these cases, and no further cases occurred except one in hospital.

Married quarters for nine married families have been constructed in the vicinity of the Engineer huts at St. George's, and the barrack accommodation so far increased, by the removal of so many families from the barrack-rooms of the Royal Barracks.

The Garrison Hospital is in course of being enlarged, and water-closets and bath and ablution rooms on an improved system will be added.

The Hutment at Prospect Hill has been in course of construction during the year and is fast approaching completion, when it will be an excellent station for troops.

In consequence of the insufficiency of barrack accommodation at St. George's, it has been necessary to encamp a portion of the troops during the summer months, to give those remaining in quarters 750 cubic feet of space, which is the least the men should have in this climate during the summer.

Although the sanitary condition of the troops at all the stations has been good during the year, Dr. Evans considers it necessary to make numerous recommendations, which are substantially the same as those which have been made on previous occasions by Medical Officers and Commissions.

Section II.

On the Extent of Invaliding.

There were 212 invalids sent to England from Canada and Nova Scotia, and 24 from the Bermudas during the year, being in the ratio of 14·07 and 19·21 per 1,000 of mean strength. Thirty-nine invalids were discharged the service in America, and 142 at Netley of those sent from Canada and Nova Scotia, and 18 of those sent from the Bermudas. These numbers give the proportion of final discharges in the ratio of 12·01 per 1,000 of mean strength of the troops in the former Commands, and 14·41 per 1,000 in the latter Command.

The disabilities for which the invalids were sent home and finally discharged the service, are stated in Abstract No. 14 in Appendix, from which the following classified summary has been framed :—

British America.

	Invalids sent home		Invalids Discharged the Service		
	From British America.	From Bermuda	In British America.	In England, sent from	
				British America.	Bermuda
Paroxysmal Fever	1	..	..	..	..
Diarrhœa	1	..	..	..	..
Chronic Dysentery	2	..	..	..	..
Erysipelas	1	..	..	..	..
Ophthalmia	6	1	1	6	..
Rheumatism	13	..	1	7	..
Enthetic Diseases	8	2	..	1	1
Diathetic „	1	..	2	..	..
Tubercular „	65	9	7	61	11
Diseases of the—					
Nervous System	29	4	6	9	2
Circulatory „	27	3	6	23	3
Respiratory „	22	..	4	10	..
Digestive „	10	2	2	7	1
Urinary „	3	..	1	2	..
Reproductive „	2	..	1	1	..
Locomotive „	2	..	1	3	..
Integumentary „	8	..	3	4	..
Diseases of Nutrition	6	3	1	3	..
Accidents and Violence	5	..	3	5	..
Total	212	24	39	142	18
Ratio per 1,000 of Mean Strength { 1867	14·1	19·2	2·6	9·4	14·4
{ 1860–66	15·8	19·9	2·2	13·9	12·5

There has been a marked reduction in the invaliding from Bermuda compared with the amount in 1866, but it differs little from the average of the last seven years. Tubercular diseases have been the cause of the greatest amount of invaliding, diseases of the nervous, circulatory, and respiratory systems ranking next in point of frequency.

Section III.

Mean Daily Sick.

During the year 1867 the average number constantly in hospital amounted to 383 in Canada, 78 in Nova Scotia and New Brunswick, 6·7 in Newfoundland, and 45 in the Bermudas. The following Table shows the ratio per 1,000 of strength constantly sick, with the average sick time to each soldier serving, and the average duration of the cases in each of these Commands.

	Canada.		Nova Scotia and New Brunswick.		Newfoundland.		Bermuda.	
	1867.	1859-66.	1867.	1859-66.	1867.	1859-66.	1867.	1859-66.
Ratio per 1,000 of strength constantly sick ..	34·07	31·28	23 03	25·58	23·93	30·10	36·03	40·93
Average sick time to each soldier	days 12·44	days 11·42	days 8·41	days 9·34	days 8·73	days 10·99	days 13·15	days 14·94
Average duration of the cases of disease	17·05	17·06	17·17	16·64	18·39	17·70	17·80	20·78

Although the results for Canada are slightly above the average, they show a considerable reduction compared with those for 1866. In Bermudas also there is a marked reduction, and the ratios are below the average of the preceding eight years. Nova Scotia and Newfoundland show a slight increase in the duration of the cases, but a reduction in the mean sick and in the average sick time to each soldier.

Section IV.

Influence of Age on the Mortality.

The number of men at each age serving throughout the year in British America, and the deaths among them at each period, are shown in Abstract No. 15 in Appendix. The results are given in the following Table :—

Stations.	Ratio of Deaths per 1,000 of Strength at each age.					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Canada, Nova Scotia, New Brunswick, and Newfoundland ..	5·75	5·37	7·69	10·15	25·78	31·25
Bermuda	74·07	3·17	14·52	17·94	43·10	250·00
Total { 1867 ..	8·30	5·13	8·40	10·94	27·78	35·09
Total { 1859–66 ..	3·30	7·00	11·95	12·08	18·80	15·71

The irregularity in the results for the Bermudas arises from the small numbers under observation; and to the same cause may be ascribed the apparently very high ratios at the ages under 20 and above 40. In the results for the preceding eight years the same break in the progressive increase of mortality with the advance of age, at the period 30 and under 35, which was found in the returns for the Mediterranean Commands may be observed here, attributable probably in both instances to the same cause—the elimination of diseased lives at the expiration of the first period of service.

IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

Section I.
Sickness and Mortality.

I. Windward and Leeward Command.

STATISTICAL REPORT.

1. White Troops.

Windward and Leeward Command.

The white troops employed in the Windward and Leeward Command throughout the year consisted of the 8th Battery 1st Brigade Royal Artillery, the 2nd Battalion 16th Regiment, a small detachment of the Army Hospital Corps, and the European non-commissioned officers of the West India Regiment. The average strength was 806, the admissions into hospital were 866, and the deaths 9, of which 7 occurred in, and 1 out of hospital, and 1 among the invalids sent to Netley. These numbers give the ratio of 1,074 admissions, and 11·16 deaths per 1,000 of mean strength, both very much lower than in 1866.

The admissions and deaths by the different classes of diseases are shown in the following Table. The details for 1867 will be found in Abstract No. 16 in Appendix:—

Windward and Leeward Command.

Order.	Diseases.	1867. Strength, 806. Admitted.	Died. In the Command.	Died. Of Invalids.	Died. Total.	1867. Ratio per 1,000. Admitted.	Died.	1859–66. Ratio per 1,000. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases. ..	169	3	..	3	209·7	3·72	555·0	6·65
2	Enthetic „	236	..	..	..	292·8	..	163·2	..
3	Dietic „	41	..	..	..	50·9	..	32·1	·55
4	Parasitic „	1	..	..	..	1·2	..	5·9	..
	Class II.								
1	Diathetic Diseases . ..	14	..	..	..	17·4	..	6·1	..
2	Tubercular „	14	2	1	3	17·4	3·72	10·1	1·42
	Class III. Diseases of the—								
1	Nervous System ..	38	..	..	..	47·1	..	32·7	1·96
2	Circulatory „	17	1	..	1	21·1	1·24	6·2	·87
3	Respiratory „	26	..	..	..	32·3	..	33·8	·33
4	Digestive „	70	1	..	1	86·8	1·24	66·0	·87
5	Urinary „	1	..	..	..	1·2	..	1·2	..
6	Reproductive „	11	..	..	..	13·6	..	17·5	..
7	Locomotive „	4	..	..	..	5.0	..	3·4	..
8	Integumentary „	119	..	..	..	147·6	..	166·1	..
	Class IV.								
4	Diseases of Nutrition ..	8	..	..	..	9·9	..	2·8	..
	Class V.								
1	Accidents	95	1	..	1	117·9	1·24	98·8	·65
4	Suicide	..	..	..	..	..	..	·4	·55
6	Corporal Punishment ..	2	..	..	..	2·5	..	2·2	..
	Diseases not stated ..	..	..	..	..	..	..	2·4	..
	Total ..	866	8	1	9	1074·4	11·16	1205·9	13·85

The admissions and deaths have been under the average of the preceding eight years, the reduction being marked in miasmatic diseases.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases in this class have been as follows:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1859-66. Admitted.	1859-66. Died.
Eruptive Fevers	..	..	..	..	1·3	..
Paroxysmal „	55	1	68·2	1·24	297·0	3·82
Continued „	24	..	29·8	..	55·6	·65
Yellow Fever	2	1	2·5	1·24	3 2	1·74
Dysentery, Diarrhœa, & Cholera	28	1	34·7	1·24	63·8	·22
Sorethroat and Influenza ..	22	..	27·3	..	11·8	·11
Ophthalmia	13	..	16·1	..	85·4	..
Rheumatism	10	..	12·4	..	24·7	..

Paroxysmal Fevers, did not amount to one-fourth of the average of the eight preceding years, a result doubtless of the withdrawal of white troops from British Guiana. It is stated that the greater number of the

Windward and Leeward Command.

cases which occurred both at Barbadoes and Trinidad were in men who had previously had intermittent fever in Demerara.

Continued Fevers were also much below the average. They were indeed less prevalent than among troops in the Mediterranean, and did not cause any mortality.

Yellow Fever.—On the 5th of October, an officer of the 16th Regiment, who had just arrived at Barbadoes by the mail steamer from Halifax, *viâ* St. Thomas's, where he had been ashore for 36 hours, and where yellow fever was prevailing, was attacked by the disease, and died on the 8th. On the 31st, an Ensign of the same regiment, who occupied quarters on the upper floor of the Brick Barracks, closely adjoining those in which the first case had died, was attacked, and he died on the 7th of November. Immediately on the occurrence of these cases, the officers' quarters were vacated. On the 7th November, the mess serjeant of the regiment was attacked, and died in hospital on the 10th. On the 8th and 9th, the whole of the white troops were removed, the Royal Artillery being encamped at the Naval Hospital, and the 2nd Battalion 16th Regiment at Gun Hill. One case of yellow fever occurred in the latter three days after the move, but the man recovered. No further cases of the disease having occurred, the Royal Artillery returned to barracks on the 18th of December, and the 16th Regiment in the end of the month.

Dysentery and Diarrhœa, which prevailed to a very considerable extent in the 16th Regiment after its arrival at Barbadoes in 1866, furnished little more than half the average proportion of cases.

Ophthalmia also shows a most satisfactory reduction, only 13 cases having been admitted during the course of the year.

Tonsillitis and Influenza were more prevalent than usual. All the cases occurred in the 16th Regiment during the cold season, but none of them were of any severity.

Enthetic Diseases were greatly above the average of the preceding eight years, and were 32 per 1,000 above the proportion in 1866. The increase has taken place in cases of bubo and gonorrhœa, while there has been a reduction in those of primary and secondary syphilis. The increase has been entirely at Barbadoes.

There has been an increase in diseases of the nervous, circulatory, and digestive systems, and a decrease in those of the integumentary systems, but when the numbers are so limited considerable fluctuations may be expected. The mortality by miasmatic diseases has not much exceeded half the average; but this improvement has been counterbalanced by an increase in the deaths by tubercular diseases.

Barbadoes and Trinidad were the only stations occupied by white troops. The admissions into hospital at the former were in the ratio of 1,084, and at the latter of 1,028 per 1,000 of the strength, both below the average. The deaths at Barbadoes were 9·14, and at Trinidad 13·98, the former a little above and the latter below the average. The chief points of difference between the two stations was the greater prevalence of venereal diseases at Barbadoes, where the ratio was 331 as against 126 per 1,000 at Trinidad, and the greater proportion of cases of intermittent fever at the latter. The admissions and deaths by the various diseases at these two stations will be found detailed in Abstract No. 16 in Appendix, but the numbers are so small, and the difference in the prevalence of the classes of diseases so trifling that it seems unnecessary to submit the usual Tables in this part of the Report.

III.—Black Troops.

In the middle of January, the head-quarters and three companies of the 4th West India Regiment, from the West Coast of Africa, relieved the detachment of the 3rd West India Regiment, at Barbadoes; and in the end of the month a company relieved one of the 3rd West India Regiment, which had been sent from Jamaica to Demerara, on the withdrawal of the white troops in 1866, and which now rejoined its head-quarters.

The average strength of the black troops throughout the Command during the year was 603; the admissions into hospital were 629, and the deaths 23,

of which two occurred out of hospital. The ratio of admissions, therefore, was 1,043, and of deaths 38·14 per 1,000 of the strength, both considerably higher than in 1866, and the deaths nearly double the average proportion. This great increase was probably the result of the previous service of the corps in Western Africa. *Windward and Leeward Command.*

The influence of the different classes of diseases in causing this amount of sickness and mortality is shown in the following Table. The details for 1867 will be found in Abstract No. 17 in Appendix :—

Orders.	Diseases.	1867. Strength 603. Admitted.	1867. Strength 603. Died.	1867. Ratio per 1,000. Admitted.	1867. Ratio per 1,000. Died.	1859-66. Ratio per 1,000. Admitted.	1859-66. Ratio per 1,000. Died.
	Class I.						
1	Miasmatic Diseases	110	4	182·4	6·63	262·3	4·01
2	Enthetic „	296	..	490·9	..	258·0	..
3	Dietic „	1	..	1·7	..	1·1	..
4	Parasitic „	2	..	3·3	..	7·5	..
	Class II.						
1	Diathetic Diseases	4	1	6·6	1·66	5·3	·41
2	Tubercular „	25	8	41·5	13·27	18·4	6·35
	Class III. Diseases of the—						
1	Nervous System	24	3	39·8	4·97	17·0	1·66
2	Circulatory „	2	3	3·3	4·97	2·8	·97
3	Respiratory „	38	2	63·0	3·32	75·0	2·49
4	Digestive „	23	2	38·1	3·32	32·7	1·10
5	Urinary „	2	..	3·3	..	2·9	·69
6	Reproductive „	8	..	13·3	..	13·5	..
7	Locomotive „	2	..	3·3	..	2·6	..
8	Integumentary „	46	..	76·3	..	133·0	·14
	Class IV.						
4	Diseases of Nutrition	..	..	..	..	1·4	·28
	Class V.						
1	Accidents	44	..	73·0	..	68·1	·55
3	Homicide	..	..	..	..	·2	·41
4	Suicide	..	..	..	..	·1	·69
5	Execution	..	..	..	..	..	·14
6	Corporal Punishment	2	..	3·3	..	4·8	..
	Diseases not specified	..	..	..	..	9·4	..
	Total	629	23	1043·1	38·14	916·1	19·89

The admissions have been considerably above the average, the excess being chiefly in venereal diseases, and the deaths have been nearly double the average, the increase being most marked in tubercular, but extending also to the other classes of diseases.

Miasmatic Diseases have been about one-third below the average. When subdivided the following results are obtained :—

Windward and Leeward Command.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1859-66. Admitted.	1859-66. Died.
Eruptive Fevers	1	..	1·6	..	18·6	·28
Paroxysmal „	30	1	49·8	1·66	74·2	1·51
Continued „	8	1	13·3	1·66	17·1	·69
Dysentery and Diarrhœa	26	..	43·1	..	28·1	1·10
Sorethroat and Influenza	1	..	1·6	..	21·6	..
Ophthalmia..	3	..	5·0	..	23 3	..
Rheumatism	41	2	68·0	3·31	81·6	·28

Compared with the results for 1866, there has been an increase in the amount of *Paroxysmal Fevers* and *Dysentery and Diarrhœa*, but a very marked reduction in all the other diseases. Compared with the average of the eight years, there has been a reduction in all the diseases except *dysentery and diarrhœa*, the admissions from which have been more than doubled.

Enthetic Diseases show an enormous increase. This has not been confined to any group of diseases, although it has been more marked in the gonorrhœal than the syphilitic. The following Table shows the average number constantly non-effective from venereal diseases during the year, with the loss of service thereby sustained, and the average duration of the cases:—

Black Troops.	Ratio per 1,000. Admitted into Hospital.	Ratio per 1,000. Constantly Sick.	Loss of Service to whole Force.	Average duration of Cases in Hospital.
			Days.	Days.
Syphilitic group.. ..	278·6	29·85	10·89	39·11
Gonorrhœal	212·3	11·74	4·28	20·18

This Table shows the loss of service caused by venereal diseases among the black troops in this Command to have been equal to that of the whole force for a period of 15 days, of which nearly three-fourths were caused by the syphilitic group.

Tubercular Diseases were greatly above the average, both in frequency and mortality. The Surgeon attached to the 4th West India Regiment attributes the prevalence of consumption among the black troops in a great measure to "the venereal poison acting on a constitution weakened by sexual excesses commenced at a very early age."

Diseases of the Integumentary System have been very much below the average, the reduction being in the number of cases of ulcer.

In the following Table, framed from Abstract No. 17 in Appendix, the influence of the different classes of diseases in causing sickness and mortality at Barbados and British Guiana respectively, is shown:—

Windward and Leeward Command.

Orders.	Diseases.	Annual Ratio per 1,000 of Strength in 1867			
		Barbadoes.		British Guiana.	
		Admitted.	Died.	Admitted.	Died.
	Class I.				
1	Miasmatic Diseases	75·5	4·58	493·6	12·82
2	Enthetic „	569·8	..	301·2	..
3	Dietic „	..	..	6·4	..
4	Parasitic „	..	..	12·8	..
	Class II.				
1	Diathetic Diseases	..	..	25·7	6·41
2	Tubercular „	48·1	13·72	25·7	12·82
	Class III.				
	Diseases of the—				
1	Nervous System	16·0	2·28	108·9	12·82
2	Circulatory „	2·3	4·58	6·4	6·41
3	Respiratory „	61·8	4·58	70·5	..
4	Digestive „	11·4	..	115·4	12·82
5	Urinary „	2·3	..	6·4	..
6	Reproductive „	9·2	..	25·7	..
7	Locomotive „	2·3	..	12·8	..
8	Integumentary „	61·8	..	115·4	..
	Class IV.				
4	Diseases of Nutrition	..	..	..	..
	Class V.				
1	Accidents	52·5	..	134·6	..
6	Corporal Punishment	2·3	..	6·4	..
	Total	915·3	29·74	1467·9	64·10
	Average of 1859-65	1006·8	20·90	818·0	18·36

The most striking points of difference between the two stations are the greater prevalence of miasmatic diseases and those of the nervous and digestive systems in British Guiana, and the excess of venereal diseases in Barbadoes. During the year, yellow fever was very prevalent among the shipping at Demerara, but no case of it occurred among the troops. The total admissions into the Seamen's Hospital by yellow fever amounted in the 12 months to 473, and the deaths to 111. The largest number occurred in January, when there were 141 cases and 27 deaths. The high ratio of admissions by diseases of the nervous system, in British Guiana, was caused by the occurrence of 10 cases reported under headache (*cephalæa*), and of the digestive system by a similar number of cases of dyspepsia.

Compared with the results of the preceding eight years, there has been a considerable decrease in the admissions, and increase in the deaths at Barbadoes, and a very marked increase in both in British Guiana. The numbers under observation are, however, too small to admit of any positive deductions being founded on the results of a single year.

SANITARY REPORT.

Deputy Inspector-General Prendergast states that the health of the troops during the year has been very good; but, unfortunately, on the 5th October, Captain Sheringham, 2nd Battalion 16th Regiment, reported himself sick immediately on landing from the Royal Mail Company's Steamer from Halifax, Nova Scotia, *viâ* St. Thomas. At the latter place he was detained several hours. The disease from which he laboured on arrival at Barbadoes was a masked form of yellow fever, which ended fatally on the 8th October at

Windward and Leeward Command.

the officers' quarters, Brick Barracks. The appearance of two cases of yellow fever subsequently,—one on the 31st October, an officer 2nd Battalion, 16th Regiment, occupying quarters, upper flat, at the Brick Barracks; and the other, on the 7th November, the serjeant of the officers' mess, 2nd Battalion 16th Regiment,—rendered it necessary that the Brick Barracks as well as the Artillery Barracks at St. Ann's should be vacated, limewashed, and cleansed, as far as possible. The 2nd Battalion, 16th Regiment, was encamped at Gun Hill on the 8th and 9th November, and the men of the Royal Artillery were encamped at the Naval Hospital at the same time. The battery of Artillery having remained until the 18th December in excellent health, the men returned to barracks.

The arrangements made by the Military Authorities for encamping the men were, on the whole, highly satisfactory; each tent being provided with flooring before occupation.

One company 2nd Battalion, 16th Regiment, returned to St. Ann's, on the 30th December, from undergoing a course of musketry instruction, and the men were placed under canvas on the Savannah, owing to the barracks not being then ready for their reception.

Brick Barracks.—Additional barrack accommodation is absolutely necessary, the superficial area per man being insufficient, averaging from 48 to 62 square feet; the lower rooms of these barracks are unfit for the occupation of white troops. New guard-room, prisoner's room, cells and canteen have been completed and taken into use during the year. A new latrine has been erected (Jennings' pattern) and answers well. Another latrine, I understand, is to be put up on the same principle for the accommodation of the men occupying the upper or south wing of the barracks. A bath-house is required to be built for single men and the officers. The present system of the urine tubs is unsatisfactory.

Royal Artillery Barracks.—The new latrine (Jennings' pattern) has been brought into use, also the new washhouse. There is an ample supply of water at hand, but the quantity allowed for the baths only permits each man to have one bath a week, and that of only four inches depth. An increased supply is absolutely necessary, to meet the sanitary wants of the men.

The married people are very badly off for quarters—the huts are all old; quarters require to be built on the same principle as those allotted to the married families at the men's Brick Barracks. This desideratum is to be included in the Estimates for 1869-70.

Stone and Iron Barracks.—The huts used as quarters by the European non-commissioned officers attached to the West India Regiments are too low, and besides being old, they are badly situated. New quarters are to be introduced in the Estimates for 1869-70.

The latrines and urinals are old, and frequently exceedingly offensive; these require reconstruction on modern principle and to be put in connection with pipe drainage.

Guard-room and cells badly placed, and require reconstruction.

Dockyard Barracks.—The cells and the prisoners' room are too small; new ones are required.

Latrines and urinals badly constructed; new ones should be built.

Hospital.—Requirements many: water-closets, baths and ablution rooms attached to wards, which, I understand, are to be supplied.

The latrine is constructed on the old principle, and is common to the white and black troops.

The ventilation in the prisoners' ward, and lower ward of the hospital occupied by black troops is defective.

The general system of drainage in this garrison is in course of completion.

II. Jamaica.

STATISTICAL REPORT.

I White Troops.

Jamaica.

In the beginning of April, the 84th Regiment, from Malta, relieved the 2nd Battalion 6th, which embarked for England. The white troops serving in the island during the year consisted of these corps, with the 7th Battery 1st Brigade Royal Artillery, and the European non-commissioned officers of the black troops. The average strength was 788, the admissions into hospital amounted to 940, the deaths in hospital to 52, out of hospital to 3, and among the invalids to 1, making a total of 56. The admissions, therefore, were in the ratio of 1,193, and the deaths of 71·07 per 1,000 of the strength, the former being much lower than, and the latter thrice as high as, in 1866.

The admissions and deaths by each disease are detailed in Abstract No. 16 in Appendix, from which the following classified Table has been framed:—

Order.	Diseases.	1867. Strength, 788. Admissions.	Deaths. In Jamaica.	Deaths. Of Invalids.	Deaths. Total.	1867. Ratio per 1,000. Admitted.	1867. Ratio per 1,000. Died.	1859-66. Ratio per 1,000. Admitted.	1859-66. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	515	45	..	45	653·6	57·10	398·2	6·75
2	Enthetic „ ..	61	..	..	..	77·4	..	127·7	..
3	Dietic „ ..	29	1	..	1	36·8	1·27	32·3	·37
4	Parasitic „ ..	3	..	..	..	3·8	..	12·0	..
	Class II.								
1	Diathetic Diseases.. ..	..	..	..	..	..	..	3·4	·18
2	Tubercular „ ..	6	1	1	2	7 6	2 54	9·9	1·50
	Class III. Diseases of the—								
1	Nervous System ..	21	1	..	1	26·7	1·27	21·6	1·69
2	Circulatory „ ..	5	4	..	4	6·4	5·08	5·8	1·31
3	Respiratory „ ..	28	1	..	1	35·5	1·27	45·9	·56
4	Digestive „ ..	41	..	..	..	52·0	..	72·4	1·31
5	Urinary „ ..	2	..	..	..	2·5	..	2·6	·18
6	Reproductive „ ..	15	..	..	..	19·0	..	4·5	..
7	Locomotive „ ..	7	..	..	..	8·9	..	3·6	·18
8	Integumentary „ ..	82	..	..	..	104·1	..	155·2	..
	Class IV.								
4	Diseases of Nutrition ..	25	1	..	1	31·7	1·27	25·1	..
	Class V.								
1	Accidents	98	1	..	1	124·4	1·27	137·8	·37
3	Homicide	..	..	..	..	..	..	..	·18
4	Suicide	.	..	..	..	..	..	·2	·94
6	Corporal Punishment ..	2	..	..	..	2·5	..	3·9	..
	Diseases not specified ..	..	..	..	..	..	..	·7	..
	Total	940	55	1	56	1192·9	71·07	1062·8	15·52

The admissions and deaths, but particularly the latter, have been greatly in excess of the average of the preceding eight years. The great increase has taken place in miasmatic diseases.

Miasmatic Diseases, when subdivided, give the following results:—

Jamaica.

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength			
			1867.		1859–66.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	..	..	..	..	·7	..
Paroxysmal „	221	2	280·5	2·54	120·7	3·18
Continued „	83	4	105·3	5·08	107·1	2·81
Yellow Fever	90	38	114·2	48·22	·4	·19
Dysentery, Diarrhœa, &c. ..	55	1	69·8	1·27	48·0	·19
Sorethroat and Influenza ..	5	..	6·4	..	21·7	..
Ophthalmia	10	..	12·7	..	65·2	..
Rheumatism	48	..	60·9	..	28·5	·19

Paroxysmal Fevers prevailed to considerably more than double the average amount. This was chiefly from the occurrence of remittent fever in the 84th Regiment at Newcastle, 191 cases having been admitted there under that head.

Yellow Fever.—In the end of 1866 and the early part of 1867, several cases of yellow fever occurred among the men of the Royal Navy, Royal Mail Steamers, and dockyard at Port Royal, and among the merchant seamen at Kingston, but no case appeared among the troops till the end of February. On the 25th of that month, three cases of fever occurred at Kingston Barracks, in men forming part of a baggage guard of the 2nd Battalion 6th Regiment, and were sent up to Newcastle, where they died on the 1st and 4th of March. Two of these were reported as continued, and one as yellow fever. On the 10th of March, an officer of the same corps died of yellow fever at Newcastle, having a few days previously ridden up from Up Park Camp, where he had contracted the disease. No further case occurred among the military till the 9th of May, when a gunner of the Royal Artillery was admitted into hospital at Port Royal, where he died on the 12th. The battery, with the exception of 19 men, was immediately removed from Port Royal, and encamped at Newcastle. One of those who remained at Port Royal, having been attacked by the disease, the remainder, except two, were removed. The three thus left behind died on the 5th, 7th, and 9th of May. Two cases occurred subsequently in the battery at Newcastle, one on the 10th of August, and the other on the 17th October, and both recovered. There was also a case at Spanish Town, in August, that of a bombardier employed at Government House, who was sent to hospital at Up Park Camp on the 18th, and died there on the 20th of that month. In April, a fatal case occurred in a European serjeant of the 3rd West India Regiment at Port Royal; he was admitted on the 25th, and died on the 27th.

The 84th Regiment landed in Jamaica on the 6th April, from Malta, and was immediately marched up to Newcastle, with the exception of two companies detached to Up Park Camp. On the 27th April, in consequence of the prevalence of yellow fever, this detachment rejoined head-quarters. In the end of June, some suspicious cases of fever occurred, and on the 29th of that month the first case terminated fatally. The disease spread among the men, and proved very fatal, 13 deaths having been caused by it among them in July, and 13 in August. It then ceased for some time, there being no fatal cases in September, and only one in October. In November, however it again broke out, though to a much more limited extent, only four deaths having occurred. One death by it occurred in December, at Up Park Camp, that of a private of the 84th Regiment, who had deserted some time previously, and was brought back in the Royal Mail Steamer from Colon. When landed he was suffering from yellow fever.

During the course of this epidemic there where 90 cases of yellow fever admitted into hospital, from a strength of 818 non-commissioned officers and men serving in the Island, and of these 31 died. In the same period 10 cases and 5 deaths occurred among 82 officers; 11 cases and 5 deaths among 105 women; and 2 cases, both of which recovered, among 135 children. The

officers therefore appear to have suffered in rather a higher proportion than the men. Of the former, two were of the Commissariat Department, two regimental officers, and one Staff Assistant Surgeon. *Jamaica.*

Dysentery and Diarrhœa were considerably above the average, chiefly from the prevalence of the latter among the newly arrived men of the 84th Regiment.

ENTHETIC DISEASES were much below the average, probably from the concentration of the white troops at Newcastle and the strict surveillance, and to a certain degree isolation, maintained during the prevalence of the yellow fever.

DISEASES OF THE CIRCULATORY SYSTEM gave rise to a higher proportion of deaths than usual. They all occurred in the 84th Regiment; two were caused by aneurism of the aorta, and two by disease of the valves of the heart.

The other classes of diseases do not seem to require special notice.

II. BLACK TROOPS.

In January, a detachment of the 3rd West India Regiment which had been sent to Demerara in the preceding year, to relieve the white troops then suffering from yellow fever, rejoined Head-Quarters.

The average strength of the black troops during the year was 722. The admissions into hospital amounted to 948, and the deaths to 21, of which one occurred out of hospital; the former therefore were in the ratio of 1,313, and the latter of 29·08 per 1,000 of mean strength. These numbers show a considerable reduction in the admissions, but an increase of 6 per 1,000 in the deaths compared with the results for 1866.

The following Table framed from Abstract No. 17 in Appendix, shows the influence of the different classes of diseases in causing this amount of sickness and mortality:—

Jamaica.

Order.	Diseases.	1867. Strength, 722. Admitted.	Died at Jamaica.	1867. Ratio per 1,000. Admitted.	Died.	1859-66. Ratio per 1,000. Admitted.	Died.
	Class I.						
1	Miasmatic Diseases.. ..	280	5	387·8	6·93	485·3	7·49
2	Enthetic „	319	..	441·8	..	393·0	·52
3	Dietic „	1	..	1·4	..	2·6	..
4	Parasitic „	15	..	20·8	..	7·8	..
	Class II.						
1	Diathetic Diseases	6	..	8·3	..	5·9	·70
2	Tubercular „	23	6	31·9	8·31	17·4	6·10
	Class III. Diseases of the—						
1	Nervous System ..	20	1	27·7	1·38	22·5	1·92
2	Circulatory „	1	..	1·4	..	2·6	·87
3	Respiratory „	58	4	80·3	5·54	78·9	4·36
4	Digestive „	30	4	41·5	5·54	36·4	1·74
5	Urinary „	1	..	1·4	..	5·1	·17
6	Reproductive „	11	..	15·2	..	14·3	..
7	Locomotive „	2	..	2·8	..	5·9	..
8	Integumentary „	123	..	170·4	..	129·6	·17
	Class IV. Diseases of Nutrition ..	1	..	1·4	.	2·6	·17
	Class V.						
1	Accidents	57	..	78·9	..	71·4	·87
3	Homicide	..	..	..	..	·3	·35
4	Suicide	..	1	..	1·38	..	·87
5	Execution	..	..	..	..	..	·35
6	Corporal Punishment ..	..	..	..	..	3·7	..
	Diseases not specified ..	..	..	..	..	1·9	..
	Total	948	21	1313·0	29·08	1287·2	26·65

The admissions, though much lower than in 1866, have been slightly in excess of the average of the last eight years. The decrease from the preceding year has been in miasmatic and enthetic diseases. The excess over the average has been in enthetic diseases and those of the integumentary system, but there has been a decrease to the extent of one-fifth in the amount of miasmatic diseases.

MIASMATIC DISEASES when subivided give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1859–66. Admitted.	1859–66. Died.
Eruptive Fevers	2	..	2·8	..	7·8	·70
Paroxysmal „	13	..	18·0	..	277·0	3·83
Continued „	108	5	149·6	6·93	33·4	1·39
Dysentery and Diarrhœa ..	35	..	48·5	..	30·3	1·22
Sorethroat and Influenza ..	10	..	13·8	..	31·7	..
Ophthalmia	25	..	34·6	..	21·6	..
Rheumatism	82	..	113·6	..	79·4	·17

There has been a very great reduction in the cases of paroxysmal fevers, but an increase, though to a much less extent, in those of continued fever. Of the latter a large proportion were very slight, and might probably with equal propriety have been returned as ague. Combining the two forms there has been a reduction to the amount of 142 per 1,000. *Ophthalmia* and *rheumatism* have both been above the average, but the former was less prevalent than in 1866. *Jamaica.*

ENTHETIC DISEASES, though still very prevalent and considerably above the average, have undergone a reduction to the amount of 125 per 1,000 compared with the admissions in 1866. The decrease has been in equal proportions in cases of syphilis and gonorrhœa. Their prevalence has been nearly six times as great among the black as among the white troops.

TUBERCULAR DISEASES have given rise to nearly double the average proportion of admissions, and have also been more fatal than usual. They have been the cause of upwards of one fourth of the whole mortality; and in addition to them there has been a high death rate from inflammation of the lungs.

DISEASES OF THE INTEGUMENTARY SYSTEM, though still a very prominent cause of sickness, have been less prevalent than in 1866. Ulcers were the chief cause of admissions under this class.

SANITARY REPORT.

Deputy Inspector-General O'Flaherty reports:—

At *Up Park Camp*, the Surgeon in charge considers that the cess-pit latrines in the barracks are very offensive, and placed too near the men's barracks, and that their emanations are injurious. These latrines were built in 1859–60, in a substantial style, and on what was then considered a perfect plan, in the best and most convenient places, and they are now as good as latrines, constructed as cesspools, can possibly be; they are, however, in spite of all the care bestowed upon them, as offensive as such places usually are in barracks. The Surgeon advocates an earth system, which has been experimentally applied to the hospital latrines and to one in the barracks, and in both it is considered to be *practically* better and far less offensive than the cess-pit. In the Civil Penitentiary and Lunatic Asylum, in Kingston, the earth closet system has had a long practical trial, with very satisfactory results. With such a system at Up Park Camp there would not be any necessity to remove the latrines to a greater and inconvenient distance from the barracks. More ablution accommodation is required; and separate quarters for married officers and soldiers, reading-room, gymnasium and larger canteen are all requisite for this station, together with the introduction of an evening meal in the black regiment. The evening meal for black troops was proposed by me six years ago, when serving as Principal Medical Officer in the island.

I recommend that the linen frock now in use be substituted by one of some light woollen material; the linen dress requires daily washing, is often put on not perfectly dried, and it has all the defects of the old white, pipe-clayed cloth jacket, and white linen trowsers, that were long ago abolished in the Army. The linen frock is unsuited as to colour and material for the duties and health of the soldier. The Surgeon also objects to the leather leggings of the Zouave dress; they appear to me to be very unsuitable, causing excessive perspiration, and not unfrequent ulceration of the legs, in the same way that tight boots affect the soldiers' feet; in other respects I think the dress is suitable, combining show with utility.

Port Royal was occupied by white troops from January to April, during which latter month cases of yellow fever occurred in the men of the Royal Artillery, and their removal to Newcastle was recommended. Before this was carried out, however, five fatal cases were recorded. The disease was prevalent amongst the seamen in Port Royal Harbour, but was not at the time epidemic on shore. The removal was very successful, no other death occurred, and only two cases of the disease were treated at Newcastle during the stay

Jamaica. of the Battery there. The occurrence of this fever at Port Royal is not attributed by the Surgeon to any insanitary defects of Port Royal Barracks, but he recommends that the Royal Artillery be permanently stationed at Newcastle, a decision already made by His Royal Highness the Commander-in-Chief.

Port Antonio has been occupied by 27 men and one officer, 3rd West India Regiment, and a Staff Assistant-Surgeon; the latter died of yellow fever. The barrack is in every way sufficient for its numbers at present, and the bush and marshy piece of ground adjoining the barracks, noticed in last year's Report, is removed and drained.

Falmouth has been occupied by 97 men and three officers, 3rd West India Regiment; it is a temporary occupation of an old barrack, and, if it is to be permanently occupied, will require a considerable expenditure.

Mandeville, in Manchester, has been occupied by 43 men and four officers of 2nd Battalion 6th, and 84th Regiment; it is a temporary barrack, a hired building, close to the town; the detachment has been healthy, and no disease has arisen from any sanitary defects.

Kingston and Spanish Town, occupied by very small detachments of 3rd West India Regiment, require no notice here.

Newcastle was occupied by 2nd Battalion of 6th Regiment until April, when it was relieved by 84th Regiment. In June, July, and following months, an epidemic of yellow fever affected this station, causing much mortality.

[The reader is referred to the Appendix, page , for the Report of the Commission on Yellow Fever at Newcastle.]

III. Bahamas.

STATISTICAL REPORT.

Bahamas. The average strength of the white troops during the year was 14. Eight cases were admitted into hospital, and 1 serjeant-major died on furlough of remittent fever.

The average strength of the black troops was 392, among whom there were 473 admissions into hospital, and 9 deaths, being in the ratio of 1206·6, and 22·95 per 1,000 of the strength: the former higher and the latter lower than in 1866.

The influence of the different classes of diseases on the sickness and mortality is shown in the following Table framed from Abstract No. 17 in Appendix.

Order.	Black Troops. Diseases.	1867. Strength, 392. Admitted.	1867. Strength, 392. Died.	1867. Annual Ratio per 1,000. Admitted.	1867. Annual Ratio per 1,000. Died.	1859-66. Annual Ratio per 1,000. Admitted.	1859-66. Annual Ratio per 1,000. Died.
	Class I.						
1	Miasmatic Diseases ..	103	1	262·8	2·55	311·0	4·14
2	Enthetic „ ..	206	..	525·5	..	154·8	·69
3	Dietic „ ..	..	..	..	..	2·8	..
4	Parasitic „ ..	..	..	..	..	5·9	..
	Class II.						
1	Diathetic Diseases ..	4	..	10·2	..	13·8	·69
2	Tubercular „ ..	11	4	28·1	10·20	27·9	11·04
	Class III. Diseases of the—						
1	Nervous System ..	10	..	25·5	..	16·6	2·07
2	Circulatory „ ..	1	1	2·5	2·55	2·4	·34
3	Respiratory „ ..	27	1	68·9	2·55	90·0	5·86
4	Digestive „ ..	2	..	5·1	..	25·5	1·73
5	Urinary „ ..	3	2	7·6	5·10	2·4	..
6	Reproductive „ ..	6	..	15·3	..	16·2	..
7	Locomotive „ ..	4	..	10·2	..	3·4	..
8	Integumentary „ ..	58	..	148·0	..	90·7	·69
	Class IV.						
4	Diseases of Nutrition ..	..	..	..	..	1·0	..
	Class V.						
1	Accidents	37	..	94·4	..	69·7	·34
4	Suicide	..	..	..	..	·3	·34
6	Corporal Punishment ..	1	..	2·5	..	3·8	..
	Diseases not specified ..	..	..	..	..	2·8	..
	Total	473	9	1206·6	22·95	841·0	27·93

The admissions have been very greatly in excess of the average of the preceding eight years, the difference being caused principally by enthetic diseases, and, though to a much less extent, by those of the integumentary system.

Miasmatic Diseases were under the average. About one half of the admissions were caused by fever, and one-third by rheumatism. The only death in this class was by continued fever.

Enthetic Diseases gave rise to a very large ratio of admissions; those of the syphilitic and gonorrhœal groups being in equal proportions. The medical officer in charge states that, "the disease originated from some French troop-"ships calling at the port on their way for the removal of the Mexican troops. "The civil authorities have never taken much notice of it until now that it has "become firmly established in the Island."

Tubercular Diseases continue to furnish a high ratio both of admissions and deaths. The Medical Officer attributes their prevalence to overcrowding of the barracks and defective ventilation.

Diseases of the Integumentary System have been much above the previous average, the excess being caused by a large number of cases of ulcer.

IV. Honduras.

STATISTICAL REPORT.

Honduras.

The average strength of white troops in Honduras during the year was 11. There were 15 admissions into hospital among them, 8 being from fever, and no deaths.

The average strength of the black troops during the year was 363; the admissions into hospital were 323, and the deaths 8. The ratio of admissions therefore was 890, and of deaths 22·05 per 1,000 of the strength, the former being considerably above, and the latter less than one half the proportion in 1866.

The admissions and deaths by the different classes of diseases, are shown in the following Table, framed from Abstract No. 17 in Appendix :—

Order.	Black Troops.	1867. Strength, 363.		1867. Annual Ratio per 1,000.		1859-66. Annual Ratio per 1,000.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	139	1	382·9	2·76	423·0	2·43
2	Enthetic „ ..	72	..	198·3	..	115·7	..
3	Dietic „ ..	..	..	..	..	2·4	1·21
4	Parasitic „ ..	6	..	16·5	..	12·1	..
	Class II.						
1	Diathetic Diseases ..	1	..	2·8	..	4·8	..
2	Tubercular „ ..	3	1	8·3	2·76	6·5	4·04
	Class III. Diseases of the—						
1	Nervous System ..	4	..	11·0	..	16·2	3·24
2	Circulatory „ ..	..	..	..	..	3·6	2·43
3	Respiratory „ ..	19	2	52·3	5·51	52·6	1·62
4	Digestive „ ..	9	..	24·8	..	37·2	·61
5	Urinary „ ..	..	..	..	..	2·4	..
6	Reproductive „ ..	5	..	13·8	..	14·2	..
7	Locomotive „ ..	1	..	2·8	..	3·2	..
8	Integumentary „ ..	42	..	115·7	..	150·5	·40
	Class IV.						
4	Diseases of Nutrition..	6	..	16·5	..	1·2	..
	Class V.						
1	Accidents	13	3	35·8	8·26	91·8	·81
2	Battle	3	1	8·3	2·76	4·0	2·02
3	Homicide	..	..	..	..	..	·40
4	Suicide	..	..	..	..	·8	·81
5	Execution	..	..	..	..	..	·40
6	Corporal Punishment..	..	..	..	..	4·8	..
	Diseases not specified..	..	..	..	..	1·2	·40
	Total ..	323	8	889·8	22·05	948·2	21·02

The admissions have been considerably under the average of the preceding eight years; but the ratio of deaths during the two periods has been nearly identical. The decrease in the admissions was chiefly in miasmatic diseases and those of the integumentary system, and in accidents. There has been a considerable increase in the amount of venereal diseases.

In the end of January, a Force about 295 strong left Belize on an expedition against the Kaiche and Chuanha Indians. After destroying the towns of

San Pedro, San José, and San Theresa, the troops returned to Belize, leaving a company of the 4th West India Regiment at Orange Walk. They met with very little opposition from the Indians, only one man having received a gunshot wound requiring surgical treatment; but the troops underwent considerable hardships from the swampy nature of the country through which they had to march, and from the failure of the Commissariat supplies in consequence of the difficulty of transport. The medical officer in charge bears strong testimony to the value of quinine as a prophylactic. *Honduras.*

Immediately on the return of this expedition, another Force 117 strong was dispatched to the Blue Creek, Rio Hondo, where it was joined by some of the British Honduras Militia. A portion of the Force was detached to destroy the Indian towns of Narangue and Cerro, which it accomplished without any casualty. The troops remained at Fort Harley till the beginning of May, when they returned to Belize. During the stay at Fort Harley the officers suffered much from fever, and both officers and men from want of fresh provisions.

ENTHETIC DISEASES have been more prevalent than in 1866, and greatly above the average in this Command; the excess has been in cases of primary syphilis.

VIOLENT DEATHS.—The mortality by this class was very high; one man was accidentally drowned, one killed in prison by the fall of a tree, one died of sunstroke, and one from the effects of a gunshot wound received in the unsuccessful attack on San Pedro in December 1866.

Section II.

On the Extent of Invaliding.

During the year 1867 there were 37 men of the white troops invalided to England from the Windward and Leeward Command, and 17 from Jamaica, being respectively in the ratio of 45·91 and 21·57 per 1,000 of the strength; and there were 16 invalids from the former, and 7 from the latter finally discharged the service at Netley, being 19·85 and 8·88 per 1,000. *West Indies.*

There were 69 men of the black troops serving in the West Indies and Western Africa discharged the service as invalids during the year, being in the proportion of 22·29 per 1,000 of the strength employed in these colonies.

The disabilities of the invalids are detailed in Abstract Nos. 16 and 17 in Appendix, from which the following classified summary has been framed:—

West Indies.

	White Troops.				Black Troops.
	Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	West Indies and Western Africa.
Mean Strength	806.	788.	806.	788.	3,095.
Classes of Disabilities ..	Invalids sent Home.	Invalids sent Home.	Discharged as Invalids at Netley.	Discharged as Invalids at Netley.	Discharged as Invalids in the Colonies
Paroxysmal Fevers	2	..	..	..	..
Dysentery and Diarrhœa ..	2	..	..	..	2
Ophthalmia	..	..	1	..	1
Rheumatism	..	2	1	1	10
Venereal Diseases	1	..	..	..	8
Diathetic „	4	..	..	..	3
Tubercular „	11	3	5	4	16
Diseases of the—					
Nervous System	9	3	1	1	8
Circulatory „	2	..	3	..	3
Respiratory „	1	2	..	..	2
Digestive „	3	3	2	..	7
Locomotive „	..	..	1	1	4
Integumentary „	..	3	..	..	2
Diseases of Nutrition	2	..	2	..	1
Accidents and Violence ..	..	1	..	..	2
Total	37	17	16	7	69
Ratio per 1,000 of Mean Strength .. 1867 ..	45·91	21·57	19·85	8·88	22·29
Ratio per 1,000 of Mean Strength .. 1860–66	26·90	27·18	21·12	21·44	17·03

The invaliding from the Windward and Leeward Command was much above the average. Tubercular diseases and those of the nervous system were the most prominent causes. Of the 9 cases of the latter sent home from the Windward and Leeward Command, 6 were of mental derangement.

The invaliding of the black troops was above the average. Tubercular diseases, rheumatism, venereal diseases, and those of the nervous system were the most frequent causes; the last included four cases of epilepsy.

Section III.

Mean Daily Sick.

The average number constantly sick of the white troops during 1867, was 38 in the Windward and Leeward Command, and 43 in Jamaica.

Of the black troops the average was 49 in the Windward and Leeward Command, 57 in Jamaica, 21·5 in Bahamas, and 9·4 at Belize, where the average strength was 147. There is no information respecting the mean sick at the other stations occupied during the year in British Honduras. On these numbers the calculations in the following Table have been made:—

		White Troops.		Black Troops.			
		Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	Bahamas.	Honduras.
Ratio per 1,000 constantly Sick.	1867 ..	47·15	54·57	81·26	78·95	54·85	68·95
	1859–66 ..	48·63	42·93	44·34	61·14	48·49	34·40
		days.	days.	days.	days.	days.	days.
Mean Sick Time to each Soldier.	1867 ..	17·21	19·92	29·66	28·82	20·02	23·34
	1859–66 ..	17·75	15·67	16·19	22·32	17·70	12·56
Average Duration of the Cases.	1867 ..	16·02	16·70	28·43	21·95	16·59	20·42
	1859–66 ..	14·72	14·74	17·67	17·34	21·02	13·04

There has been a very marked increase in the mean daily sick both of white and black troops in Jamaica. In the Windward and Leeward Command the proportion among the white troops has been rather below the average, except as regards the duration of the cases; but among the black troops it has been much above the average, the result probably of the increased number of this class employed in British Guiana. At Nassau there has also been an increase in the ratio constantly sick and the mean sick time to each soldier, but a decrease in the duration of the cases. The returns from Honduras for 1867 refer only to the troops at Belize, but the results confirm the opinion expressed in the preceding Report, that the sick of detachments had not been systematically included in the returns.

Section IV.

Influence of Age on the Mortality.

The following Table, prepared from Abstract No. 19 in Appendix, shows the ratio of mortality at different ages, in quinquennial periods, among the white troops in the West Indies, those corps only being included which were serving there during the whole year. In the abstract of the ages of the black troops it has been deemed advisable to include with the West Indies, as in the section on invaliding, those serving in Western Africa, so far as the returns were available.

Station.		Ratio of Deaths per 1,000 of Strength at each period of Life.					
		Under 20 Years.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and Upwards.
White Troops. West Indies.	1867	..	..	16·33	13·89	58·82	200·00
	1861–65	..	5·56	12·29	16·79	11·49	37·04
Black Troops. West Indies & Western Africa	1867	5·59	42·82	49·20	45·75	22·62	18·18
	1859–65	13·85	22·46	19·70	20·56	20·93	45·45

The numbers of the white troops are too small to justify any positive conclusions from them. If the men of 40 and upwards be omitted as being too few to give anything like a correct average the returns of the black troops show the highest rate of mortality among the men under 30, or taking the average of the 7 years, 1859–65, among those under 25. These results differ from the experience of white troops in the tropics, and raise an interesting question as to the cause of this difference, whether it may arise from the system of recruiting and the complete change in the mode of living which the negro experiences on joining his regiment, or whether it may be traced to any special circumstances connected with defective barrack accommodation, with climate, or with the duties the men are called on to perform.

V.—ON THE HEALTH OF THE TROOPS SERVING IN WESTERN AFRICA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Western Africa.

The average strength of white troops during the year was about 15, of whom 2 died—a Serjeant Musketry Instructor of apoplexy, and a Company Serjeant-Major of delirium tremens.

The average strength of the black troops, with the admissions into hospital and deaths, are shown in the following Table :—

	Average Strength.	Admissions into Hospital.	Deaths	Ratio per 1,000 of Strength.		1859–66. Ratio per 1,000.	
				Admitted	Died.	Admitted	Died.
Sierra Leone ..	508	634	21	1248·0	41·33	951·7	27·29
The Gambia ..	189	197	9	1042·4	47·61	1180·4	32·00
Lagos, and The Gold Coast	318	594	16	1867·9	50·29	1447·6	47·21

Although the admissions and deaths have been considerably above the average of the preceding eight years, except the admissions at the Gambia, they have been lower than in 1866 at all the stations, with the exception of Sierra Leone, where the mortality has been higher than in that year.

The diseases by which the sickness and mortality were caused during the year are shown in Abstract No. 20 in Appendix, from which the following classified summary has been prepared :—

Order.	Diseases.	Sierra Leone, 508.						Gambia. 189.						Gold Coast and Lagos. 316.					
				1867.		1859–66.				1867.		1859–66.				1867.		1859–66.	
				Annual Ratio per 1,000.		Annual Ratio per 1,000.				Annual Ratio per 1,000.		Annual Ratio per 1,000.				Annual Ratio per 1,000.		Annual Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																		
1	Miasmatic Diseases	238	5	468·5	9·84	250·0	4·79	60	1	317·5	5·29	510·4	4·32	310	7	974·8	22·01	673·3	24·84
2	Enthetic „	188	..	370·1	..	254·4	·30	70	..	370·5	..	220·6	1·78	94	..	295·6	..	226·3	..
3	Dietic „	..	..	..	..	1·5	·60	..	..	..	..	3·0	..	1	..	3·1	..	3·3	·25
4	Parasitic „	8	..	15·7	..	45·0	..	3	..	15·9	..	15·6	..	5	..	15·7	..	196·9	..
	Class II.																		
1	Diathetic Diseases	2	..	3·9	..	4·5	..	2	1	10·6	5·29	10·0	1·30	5	..	15·7	..	10·6	·76
2	Tubercular „	11	9	21·7	17·71	17·1	6·60	5	3	26·4	15·87	10·9	6·49	7	4	22·0	12·58	13·4	6·06
	Class III.																		
	Diseases of the—																		
1	Nervous System	4	..	7·9	..	13·8	2·10	1	1	5·3	5·29	14·3	1·30	8	1	25·2	3·14	20·2	2·27
2	Circulatory „	7	..	13·8	..	·6	..	..	..	..	..	1·7	·86	..	1	..	3·14	1·5	·76
3	Respiratory „	44	2	86·6	3·94	64·8	5·10	15	3	79·4	15·87	110·7	7·79	37	1	116·4	3·14	63·9	5·31
4	Digestive „	26	3	51·2	5·90	27·3	4·50	6	..	31·7	..	35·0	2·60	13	..	40·9	..	39·1	1·77
5	Urinary „	..	1	..	1·97	3·9	·30	1	..	5·3	..	7·8	·86	6	1	18·9	3·14	4·8	·25
6	Reproductive „	2	..	3·9	..	16·2	..	3	..	15·9	..	15·1	..	4	..	12·6	..	14·4	..
7	Locomotive „	..	..	..	..	15·3	·30	1	..	5·3	..	8·7	·43	9	1	28·3	3·14	7·6	·25
8	Integumentary „	82	..	161·4	..	159·3	..	23	..	121·7	..	131·1	..	56	..	176·1	..	175·9	..
	Class IV.																		
4	Diseases of Nutrition	..	..	..	..	1·5	·30	..	..	..	..	1·7	..	..	..	..	..	1·3	·25
	Class V.																		
1	Accidents	22	1	43·3	1·97	59·7	·60	7	..	37·0	..	67·9	..	39	..	123·6	..	74·0	2·52
2	Battle	..	..	..	..	11·1	·90	..	..	..	..	10·4	1·73	..	..	..	..	4·2	·25
3	Homicide	..	..	..	..	..	..	..	..	..	..	·4	·43	..	..	..	..	..	·50
4	Suicide	..	..	..	..	·3	·90	..	..	..	..	·4	1·30	..	..	..	..	·9	·76
5	Execution	..	..	..	..	..	..	..	..	..	..	..	·43	..	..	..	..	..	·76
6	Corporal Punishment	..	..	..	..	4·8	..	..	..	..	..	2·6	..	..	..	..	..	7·8	..
	Malingering	..	..	..	..	..	..	..	..	..	..	·4	..	..	..	..	..	..	..
	Cause not specified	..	..	..	..	·6	..	..	..	..	..	2·6	·43	..	..	..	..	·7	·25
	Total	634	21	1248·0	41·33	861·7	27·29	197	9	1042·4	47·61	1160·4	32·00	594	16	1867·9	50·29	1447·6	47·51

Western Africa.

The ratio of admissions was lower than in 1866 at all the stations, but that of deaths was higher at Sierra Leone and on the Gold Coast. At Sierra Leone the decrease was chiefly in enthetic diseases and those of the integumentary system, and in accidents, while there was an increase in miasmatic diseases; at the Gambia it was in miasmatic diseases, those of the integumentary system, and injuries received in battle, with an increase in enthetic diseases; and on the Gold Coast it was chiefly in enthetic diseases and those of the integumentary system, while there was an increase in miasmatic diseases and those of the respiratory system.

MIASMATIC DISEASES when subdivided give the following results:—

Diseases.	Sierra Leone.			The Gambia.			The Gold Coast. and Lagos.		
	Admitted in 1867.	Ratio per 1,000 Admitted.		Admitted in 1867.	Ratio per 1,000 Admitted.		Admitted in 1867.	Ratio per 1,000 Admitted.	
		1867.	1859–66.		1867.	1859–66.		1867.	1859–66.
Eruptive Fevers	8	15·8	11·7	3	15·9	28·1	..	..	3·5
Paroxysmal „	164	322·8	117·2	15	79·4	304·5	182	572·3	353·2
Continued „	..	..	2·1	..	..	4·8	1	3·1	1·0
Dysentery and Diarrhœa ..	15	29·5	33·6	7	37·0	88·7	91	286·2	222·2
Sorethroat and Influenza ..	5	9·8	5·7	1	5·3	13·8	3	9·4	8·3
Ophthalmia	6	11·8	14·4	1	5·3	18·6	3	9·4	20·2
Rheumatism	36	70·9	57·0	33	174·6	48·4	24	75·5	55·3

Eruptive Fevers.—All the admissions under this class were cases of small-pox, which is endemic among the civil population of Free Town. Three of these 8 cases at Sierra Leone died. They are stated not to have borne satisfactory marks of vaccination.

Paroxysmal Fevers were nearly thrice as prevalent as usual at Sierra Leone, and were also much above the average on the Gold Coast, while at the Gambia the ratio of admissions was remarkably low. No reason has been assigned by the medical officers for the increase or decrease. The mortality by them was trifling, only two deaths having occurred, both on the Gold Coast.

Rheumatism gave rise to nearly four times the average proportion of admissions at the Gambia, but we are unable to assign any reason for this marked excess.

ENTHETIC DISEASES were above the average at all the stations, but show a decrease upon the amount in 1866 at Sierra Leone and on the Gold Coast.

PARASITIC DISEASES show a very great reduction on the Gold Coast. This has arisen from the absence of cases of *Guinea Worm*, of which only one was admitted during the year.

DISEASES OF THE RESPIRATORY SYSTEM furnished a large proportion of cases on the Gold Coast, owing to the prevalence of *Bronchitis* as an epidemic there in the month of November.

DISEASES OF THE INTEGUMENTARY SYSTEM have differed little from the average of the eight preceding years, but have been much less prevalent than in 1866; the reduction has been chiefly in ulcers.

Invaliding.

The invaliding from this Command has already been shown in connection with that from the West Indies.

Section III.

Mean Daily Sick.

The average number in hospital throughout the year was 24 at Sierra Leone, 9 at the Gambia, and 19 at the Gold Coast and Lagos. From these numbers the following results have been calculated:— *Western Africa.*

		Sierra Leone.	The Gambia.	The Gold Coast and Lagos.
Ratio per 1,000 constantly Sick ..	1867 ..	47·24	47·62	59·75
	1861–66..	43·86	49·15	62·33
		days.	days.	days.
Average Sick Time to each soldier ..	1867 ..	17·24	17·38	21·81
	1861–66..	16·01	17·94	22·75
Average Duration of Cases of Sickness	1867 ..	13·82	16·67	11·68
	1861–66..	15·15	13·58	14·34

Compared with the results for 1866, there has been a reduction in all these particulars except the duration of the cases on the Gold Coast. The proportion constantly non-effective from sickness at Sierra Leone has been above the average of the preceding six years, but the duration of the cases has been a day and one-third less than for that period. At the Gambia the mean sick has been under the average, but this reduction has been attended by an increase of three days in the duration of the cases; at the Gold Coast and Lagos there has been a decrease in both these particulars.

VI.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF ST. HELENA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

St. Helena. In the end of May, the detachment of the 2nd Battalion 5th Regiment, consisting of three companies, was relieved by a like number of the 99th Regiment. The average strength of the troops during the year was 381, the admissions into hospital amounted to 233, and the deaths to 2, being in the ratio of 612 and 5·24 per 1,000 of the strength, both lower than in the preceding year.

The influence of the different classes of diseases in causing sickness and mortality is shown in the following Table, framed from Abstract No. 20 in Appendix.

St. Helena.

Order.	Diseases.	Strength, 361.				Ratio per 1,000 of Strength.			
			Died.			1867.		1859–66.	
		Admitted.	At St. Helena.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	67	..	..	..	175·9	..	298·3	2·37
2	Enthetic „ ..	72	..	..	..	189·0	..	130·3	..
3	Dietic „ ..	15	..	..	..	39·4	..	38·7	·24
4	Parasitic „ ..	9	..	..	..	23·6	..	3·6	..
	Class II.								
1	Diathetic Diseases ..	..	..	..	..	..	..	4·7	·24
2	Tubercular „	..	..	..	..	..	..	6·6	1·66
	Class III. Diseases of the—								
1	Nervous System ..	17	..	..	..	44·6	..	25·6	1·43
2	Circulatory „ ..	8	1	..	1	21·0	2·62	9·7	·48
3	Respiratory „ ..	2	1	..	1	5·3	2·62	43·9	·95
4	Digestive „ ..	6	..	..	..	15·8	..	57·0	·48
5	Urinary „ ..	..	..	..	..	..	..	4·3	..
6	Reproductive „ ..	4	..	..	..	10·5	..	4·7	..
7	Locomotive „ ..	3	..	..	..	7·9	..	1·7	..
8	Integumentary „ ..	13	..	..	..	34·1	..	65·5	..
	Class IV.								
4	Diseases of Nutrition ..	1	..	..	..	2·6	..	..	..
	Class V.								
1	Accidents	14	..	..	..	36·7	..	142·6	1·66
4	Suicide	1	..	..	..	2·6	..	·2	·24
6	Corporal Punishment ..	1	..	..	..	2·6	..	1·4	..
	Diseases not specified ..	..	..	..	..	..	..	2·8	..
	No appreciable disease ..	..	..	..	..	..	..	·5	..
	Total	233	2	..	2	611·6	5·24	842·1	9·75

The admissions have been much below the average, the decrease being chiefly in miasmatic diseases, those of the digestive and integumentary systems, and in accidents. The deaths also have been very low.

Miasmatic Diseases, when subdivided, give the following results:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1867.		1859–66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	..	..	..	..	..	..
Paroxysmal „	..	..	..	..	20·4	·24
Continued „	11	..	28·9	..	95·6	·95
Dysentery and Diarrhœa ..	9	..	23·6	..	80·9	·95
Sorethroat and Influenza ..	14	..	36·7	..	19·9	..
Ophthalmia	13	..	34·1	..	25·9	..
Rheumatism	15	..	39·4	..	27·1	..

This Table shows a very marked reduction in paroxysmal and continued fevers, and in dysentery and diarrhœa, while there has been an increase in

St. Helena. sorethroat, ophthalmia, and rheumatism. The same remarks are applicable to a comparison with the results for 1866, but the reduction has been much less marked.

Enthetic diseases, though still much above the average of the preceding eight years, show a great reduction compared with their amount in 1866. This has taken place in cases of syphilis, those of gonorrhœa having been more numerous than in that year.

There has been a very great decrease under the class of accidents, as compared with 1866, the difference being chiefly in contusions and sore feet.

Invaliding. INVALIDING.—During the year, 23 invalids were sent to England, and 9 were finally discharged the Service at Netley, being in the ratio of 60·4 and 23·6 per 1,000 of the strength. These are much below the ratios in 1866, but the proportion of invalids sent home was greatly in excess of the average of the last seven years. The disabilities of the invalids are stated in Abstract No. 21 in Appendix, of which the following is a classified summary :—

Diseases.	Invalids Sent Home from St. Helena.	Discharged the Service at Invalid Depôt.
Chronic Dysentery	2	..
Ophthalmia	..	1
Chronic Rheumatism	3	1
Tubercular Diseases	..	2
Diseases of the—		
Nervous System	3	..
Circulatory „	6	3
Digestive „	2	1
Reproductive „	1	..
Locomotive „	2	1
Integumentary „	3	..
Self-inflicted Wound	1	..
Total	23	9
Ratio per 1,000 of Mean Strenth { 1867 ..	60·4	23·6
{ 1860-66 ..	31·5	13·3

The invaliding was nearly double the average. The Royal Artillery furnished much the highest amount in proportion to its strength, 11 having been sent home out of an average strength of 63 men.

Diseases of the circulatory system were the most frequent cause of invaliding.

Mean Daily Sick. The mean number of sick during the year was 8·3, or 21·79 per 1,000 of the strength, being less than half the amount in the preceding year. The mean sick time to each soldier was 7·9 days, and the average duration of the cases 13 days. In all these particulars there has been a marked reduction, and the inefficiency from sickness at St. Helena was, during the year under review, less than in any other of the Military Commands.

SANITARY REPORT.

St. Helena.

The Senior Medical Officer reports that several sanitary improvements are urgently required in James Town. A large semi-circular sewer runs through the middle of the town, and by the barracks; the privy accommodation is bad and insufficient; the drainage neglected, and a slaughter-house and cattle-yard occupy the centre of the town. Surgeon-Major Webb advocates the building of new barracks and hospital at High Knoll, and the abandonment of those in James Town.

VII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Cape of Good Hope.

In May, the 2nd Battalion 5th Regiment embarked for England, having been relieved by the 2nd Battalion 20th, from Hong Kong and Japan. In the end of May, the 86th Regiment arrived from England, *en route* for the Mauritius. In consequence of the great prevalence of fever in that island, the regiment was landed at Port Elizabeth, and remained there till the 17th December, when it re-embarked and proceeded to its original destination. As it did not form any part of the regular force at the Cape, it has not been included in the following Report on the health of the troops serving there.

The average strength of the troops in the Command during the year was 4,255; the admissions into hospital among them were 5,280, and the deaths 49. Of the latter 10 occurred out of hospital, and 7 among the invalids on their passage home ~~and at Netley. These numbers~~ give the ratio of 1,241 admissions, and 11·52 deaths per 1,000 of mean strength, both in excess of the results for 1866.

The following Table shows the admissions and deaths in each corps:—

	Average Annual Strength.	Admissions into Hospital.	Deaths.				Annual Ratio per 1,000 of Mean Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	142	157	2	..	..	2	1,106	14·08
Royal Engineers ..	243	150	2	..	..	2	620	4·13
2nd Bat. 5th Regiment.	175	137	1	..	..	1	783	5·71
1st Bat. 9th „	753	1,491	7	5	2	14	1,980	18·59
1st Bat. 10th „	725	585	5	2	3	10	807	13·79
2nd Bat. 11th „	665	717	4	1	1	6	1,078	9·02
2nd Bat. 20th „	512	621	2	..	..	2	1,213	3·91
99th Regiment	512	697	3	..	1	4	1,361	7·81
Cape Mounted Rifles ..	434	602	4	2	..	6	1,387	13·82

The two other deaths were those of a Staff Serjeant and of a private of the Army Hospital Corps.

The admissions were excessive y gh in the 1st Battalion 9th Regiment, the principal cause being the great prevalence of venereal diseases in it. In 1866, this corps suffered from the same cause to an extent much in excess of any other regiment in the Command.

The following Table, framed from Abstract No. 20 in Appendix, shows the admissions into hospital and deaths among the troops by the different classes of diseases:— *Cape of Good Hope.*

Order.	Diseases.	1867. Mean Strength, 4,255. Admitted.	Deaths. At Cape.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000 Admitted.	Ratio per 1,000 Died.	1859–66. Ratio per 1,000 of Mean Strength. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	1,321	11	1	12	310·4	2·82	274·2	2·47
2	Enthetic „ ..	1,865	..	2	2	438·3	·47	248·5	·08
3	Dietic „ ..	84	1	..	1	19·7	·23	15·2	·45
4	Parasitic „ ..	46	..	..	..	10·8	..	10·6	..
	Class II.								
1	Diathetic Diseases ..	20	..	..	..	4·7	..	3·9	·06
2	Tubercular „ ..	56	4	3	7	13·2	1·65	9·0	1·45
	Class III. Diseases of the—								
1	Nervous System ..	108	6	..	6	25·4	1·41	24·2	1·17
2	Circulatory „ ..	42	5	..	5	9·9	1·18	18·3	1·90
3	Respiratory „ ..	201	6	..	6	47·2	1·41	47·8	·81
4	Digestive „ ..	229	2	..	2	53·8	·47	46·7	·81
5	Urinary „ ..	18	..	..	..	4·2	..	1·9	·12
6	Reproductive „ ..	85	..	..	..	20·0	..	10·3	..
7	Locomotive „ ..	26	..	..	..	6·1	..	4·4	..
8	Integumentary „ ..	610	..	..	..	143·4	..	110·8	..
	Class IV.								
4	Diseases of Nutrition ..	22	..	..	..	5·2	..	·9	..
	Class V.								
1	Accidents	539	6	1	7	126·7	1·65	91·1	1·39
3	Homicide	..	..	..	..	..	..	..	·09
4	Suicide	..	1	..	1	..	·23	·1	·15
5	Execution	..	..	..	..	..	..	..	·03
6	Corporal Punishment ..	8	..	..	..	1·9	..	3·5	..
	Diseases not specified ..	..	..	..	..	..	..	5·3	..
	Total	5,280	42	7	49	1240·9	11·52	926·7	10·84

The admissions have been greatly above the average, chiefly from the prevalence of venereal diseases, and, though to a much less extent, of miasmatic diseases and those of the integumentary system, and accidents.

MIASMATIC DISEASES, when subdivided, give the following results:—

Diseases.	Admitted	Died.	Annual Ratio per 1,000 of Strength. 1867. Admitted	1867. Died.	1859–66. Admitted	1859–66. Died.
Eruptive Fevers	1	..	·2	..	1·3	·03
Paroxysmal „	92	1	21·6	·23	16·1	·06
Continued „	257	4	60·4	·94	43·6	1·25
Dysentery and Diarrhœa ..	129	5	30·3	1·18	43·4	1·10
Sorethroat and Influenza ..	123	..	28·9	..	23·5	..
Ophthalmia	372	..	87·4	..	80·9	..
Rheumatism	293	1	68·9	·23	43·0	..

Cape of Good Hope.

The admissions by this class have been above the average, the excess being principally in cases of rheumatism and continued fever. Eruptive fevers, and dysentery and diarrhœa were under the average, and the other diseases slightly above it.

The prevalence of *paroxysmal fevers* was confined to the 2nd Battalion 20th Regiment, which, as already stated, arrived from China and Japan in the end of May. Of the 92 cases admitted, 64 were from this corps, and were manifestly the result of the climate in which they had been previously serving.

Continued Fevers were also prevalent in this regiment, but the excess of these cases occurred chiefly in the 99th Regiment and the 1st Battalion 9th. The former was quartered in the early part of the year at Natal, where fever is stated to be endemic in January and February, and in the latter part of the year at Cape Town, where it was very prevalent among the civil population. The Surgeon of the 1st Battalion 9th Regiment attributed the disease chiefly to the irregularities of the men, consequent on receiving arrears of increase of pay, and gratuities on re-engagement. He says, "the men spent their money "in the lowest and dirtiest localities of the town (Cape Town), where fever "prevails."

Ophthalmia was much more prevalent than in 1866. The corps which furnished the largest proportion of cases were the 99th Regiment, in which the disease prevailed at Cape Town in April and May; the 1st Battalion 9th, also at Cape Town; the 1st Battalion 10th, at King William's Town; and the Cape Mounted Rifles. The Surgeon of the last attributes the disease to overcrowding in barracks and defective ventilation, but no special cause is assigned by the officers in charge of the other corps.

Rheumatism was slightly more prevalent than in 1866, and considerably above the average of the last eight years. The excess occurred in two regiments, the 1st Battalion 9th, which had the very large number of 102 admissions; and the 2nd Battalion 11th, which had 79. No explanation of this great excess is given by the Medical Officers in charge.

Enthetic Diseases have furnished the enormous proportion of 438 admissions per 1,000 of the strength. This has been chiefly due, as in 1866, to the 9th Regiment, stationed at Cape Town. In that corps alone the admissions amounted to 766, out of an average strength of 753, or in the ratio of 1,014 per 1,000 of the strength. Of these cases 457 belonged to the syphilitic, and 309 to the gonorrhœal group. No less than 188 were returned under the head of secondary syphilis. The admissions by this class of diseases were also high in the 1st Battalion 10th Regiment, at King William's Town, and the 2nd Battalion 11th at Fort Beaufort and Graham's Town, having amounted in the former to 332, and in the latter to 353 per 1,000 of the strength. The 99th Regiment, which was quartered in Natal during the first five months of the year, and at Cape Town during the last seven, had a large number of cases, the admissions during the year having been in the ratio of 371 per 1,000 of the strength. The greater part of the cases, however, occurred after the arrival of the regiment at Cape Town. If the calculation were made on the strength of the corps at Cape Town, and the cases in it during the seven last months of the year only, it would give an *annual* ratio of 609 per 1,000 of strength. From the quarterly returns, we have ascertained that the average number constantly in hospital in the Command during the year with venereal diseases was 104, or in the ratio of 24 per 1,000 of the strength. Hence we deduce the total loss of service during the year by these diseases to have amounted to that of the whole force for 8·76 days, and the average duration of the cases in hospital to have been 19·87 days.

Accidents.—The admissions under this class were considerably above the average, but here also the excess occurred chiefly in the 1st Battalion 9th Regiment, which had double the proportion of any other regiment in the Command, except the 20th and 99th, and in these the number was still considerably lower than in the 9th. There were 94 admissions under the head of contusion in it. No special cause has been assigned for the large proportion of these cases.

SANITARY REPORT.

Deputy Inspector-General Dane, after remarking on the satisfactory health of the troops in this Command, alludes to the epidemic of fever which had prevailed to a very serious extent in one part of the Colony (Cape Town), and to a less degree in another (Port Elizabeth). The disease almost exclusively affected the civil portion of the community. It formed the subject of a Report by Staff Surgeon-Major Thornton (*vide* Appendix No. XV.); and the epidemic in Cape Town of 1867–68 is fully described in a pamphlet written by that officer in conjunction with the Rev. T. E. Fuller, and published at the request of the Local Dispensary Committee. *Cape of Good Hope.*

The exact nature of the disease appears to have been the subject of some dispute.

The fever "was not distinctly typhoid or pythogenic, for it was not "accompanied with diarrhœa, nor, as far as we know, was there any anatomical "lesion after death. It was not an epidemic typhus, for though there were "several cases of pure typhus, in most instances there was an absence of the "distinctive rash by which that disease is recognized: neither was it "relapsing.

"Dr. Murchison and others have shown that simple continued fevers "may in warm climates become epidemic, under the influence of causes "which induce the specific types of continued fever just mentioned, viz:— "foul stenches, overcrowding, depression of vital power, poverty, &c. To "this epidemic form of simple low fever, Dr. Murchison gives the name of "'ardent continued fever.' Adopting this as a fair description of the Cape "Town epidemic, we may say that we have been visited by an epidemic of "'ardent continued fever' associated with typhus."

The average duration of the cases was about ten days; generally the fever left on the seventh day, and convalescence was very rapid.

The population of Cape Town is supposed to be about 30,000, with a half-yearly average mortality of 400; the additional mortality arising from fever within six months being 1,000. Of those attacked 9 per cent. died.

There appears to be no doubt that the insanitary condition of the localities, the deficiency of the water supply, bad drainage, overcrowding, and insufficiency of food for the poorer classes, were among the more important factors of the epidemic, which affected the military garrison, numbering with its followers 1,960 persons, to a very insignificant degree only, as there were but two deaths from fever. Dr. Dane reports very few sanitary improvements in the Command, and he recommends nearly the same measures as his predecessors.

Section II.

On the Extent of Invaliding.

The number of men sent to England as invalids during the year was 109, and the number discharged the Service as invalids was 3 in the Colony and 71 at Netley, giving the ratio of 25·6 sent home, and 17·4 discharged the Service per 1,000 of mean strength. The disabilities for which the invalids were sent home and discharged are stated in Abstract No. 21 in Appendix, from which the following classified summary has been framed —

Cape of Good Hope.

Disabilities.	Invalids sent to England.	Invalids Discharged the Service.	
		At the Cape.	At Netley.
Paroxysmal Fevers	2	..	..
Dysentery and Diarrhœa	7	..	..
Tonsillitis	2	..	..
Ophthalmia..	6	..	4
Rheumatism	10	1	5
Venereal Diseases	9	..	9
Diathetic „	1	..	..
Tubercular „	23	..	16
Diseases of the—			
Nervous System	15	1	7
Circulatory „	13	1	11
Respiratory „	5	..	2
Digestive „	4	..	3
Urinary „	1	..	1
Reproductive „	1	..	1
Locomotive „	2	..	3
Integumentary „	1	..	1
Diseases of Nutrition	2	..	4
Accidents and Violence	5	..	4
Total	109	3	71
Ratio per 1,000 of Mean Strength .. .. { 1867 ..	25·6	·7	16·7
{ 1861-6	27·1	2·3	19·5

Although the proportion of invalids sent home has been higher than in 1866, it has been under the average of the last eight years. The increase, compared with the results for 1866, has taken place in tubercular diseases and those of the nervous system. Those of the circulatory system still hold a prominent place among the causes of discharge.

Section III.

Mean Daily Sick.

The mean daily sick in the Command throughout the year amounted to 262, or 61·57 per 1,000 of the strength, a ratio considerably above that for 1866. The following Table gives the usual information on this subject:—

	1867.	1860–66.
Ratio per 1,000 of Strength constantly Sick	61·57	49·15
Average Sick time to each Soldier	days. 22·47	days. 17·94
Average duration of cases of Sickness	18·11	19·60

The proportion constantly non-effective from sickness, and the loss of service consequent thereon, have been much above the average, owing doubtless to the great increase in venereal diseases, to which we have already alluded The duration of the cases under treatment, however, has been a day and a-half under the average of the preceding eight years.

Section IV.

Influence of Age on the Mortality.

The following Table, calculated from the numbers in Abstract No. 22 in Appendix, shows the mortality by ages in quinquennial periods among the regiments which served in the Command throughout the year :—

Cape of Good Hope.

		Under 20	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Ratio of Deaths per 1,000 living ..	1867 ..	..	4·73	16·91	18·70	16·95	40·82
	1859–66	3·07	7·69	10·98	17·54	19·34	35·29

This Table shows a more rapid increase in the mortality with the advance of age than among troops at home.

VIII.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Mauritius. On the 7th of June, the 2nd Battalion 13th Regiment, and on the 8th of July, the 2nd Battalion 22nd embarked for England, on being relieved by the 32nd Regiment. Two companies of Royal Engineers left for the Cape of Good Hope on the 30th of December, being relieved by a small detachment from that station.

The average strength of the troops during the year was 1,294, the admissions into hospital amounted to 2,889, and the deaths to 53, of which 2 occurred out of hospital, and 7 among the invalids on their passage home. The admissions, therefore, were in the ratio of 2,233, and the deaths of 40·95 per 1,000 of mean strength, being nearly three times as high as in 1866.

The sickness and mortality were distributed in the different corps as follows:—

	Average *Annual* Strength.	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery.. ..	165	647	2	..	2	4	3,921	24·24
Royal Engineers ..	102	374	11	..	1	12	3,667	117·65
2nd Batt. 13th Regiment	292	1,149	22	1	4	27	3,935	92·47
„ 22nd „ ..	370	407	6	1	..	7	1,100	18·92
32nd Regiment ..	354	302	3	..	..	3	853	8·47

The very low ratio of sickness and mortality in the 32nd Regiment was doubtless owing to that corps not having arrived in the Island till after the termination of the hot season, when a considerable abatement took place in the prevalence of epidemic fever.

The admissions and deaths by the different classes of diseases are shown in the following Table, framed from Abstract No. 20 in Appendix:—

Order.	Diseases.	Strength 1,294.				1867.		1859–66.	
		Admitted.	Deaths.			Ratio per 1,000.		Ratio per 1,000	
			At Mauritius.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	2,402	39	1	40	1856·3	30·91	299·3	10·40
2	Enthetic „ ..	159	..	..	..	122·9	..	120·8	..
3	Dietic „ ..	71	1	..	1	54·9	·77	19·8	·14
4	Parasitic „ ..	1	..	..	..	·8	..	6·7	..
	Class II.								
1	Diathetic Diseases ..	4	..	..	..	3·1	..	2·5	..
2	Tubercular „ ..	8	1	4	5	6·2	3·86	10·0	2·13
	Class III. Diseases of the—								
1	Nervous System ..	17	..	..	..	13·1	..	20·0	1·10
2	Circulatory „ ..	3	1	..	1	2·3	·77	9·7	·55
3	Respiratory „ ..	27	..	..	..	20·9	..	48·7	·69
4	Digestive „ ..	51	3	..	3	39·4	2·32	71·7	1·38
5	Urinary „ ..	2	..	..	..	1·5	..	2·6	·06
6	Reproductive „ ..	3	..	..	..	2·3	..	12·5	..
7	Locomotive „ ..	2	..	..	..	1·5	..	5·2	..
8	Integumentary „ ..	58	..	..	..	44·8	..	102·5	·06
	Class IV.								
4	Diseases of Nutrition	9	..	1	1	6·9	·77	7·5	·06
	Class V.								
1	Accidents	65	..	..	..	50·2	..	67·8	·96
4	Suicide	1	1	1	2	·8	1·55	·3	·69
6	Corporal Punishment	5	..	..	..	3·9	..	3·0	..
	No appreciable disease	..	..	..	..	..	..	·3	..
	Diseases not specified	1	..	..	..	·8	..	3·8	..
	Total ..	2,859	46	7	53	2232·6	40·95	814·7	18·22

The admissions and deaths in 1867 were enormously above the average of the eight preceding years. The excess was caused by miasmatic diseases.

MIASMATIC DISEASES, when sub-divided, give the following results—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1867.		1859–66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	..	..	..	..	·3	..
Paroxysmal „	1,969	22	1521·7	17·00	13·9	·34
Continued „	213	5	164·6	3·86	63·8	1·79
Dysentery and Diarrhœa ..	160	12	123·6	9·27	133·1	3·16
Spasmodic Cholera	..	..	..	..	12·2	4·68
Sorethroat and Influenza ..	18	..	13·9	..	8·5	..
Ophthalmia	23	..	17·8	..	32·6	..
Rheumatism	15	..	11·6	..	26·4	..

Paroxysmal and *Continued Fevers*, but particularly the former, were the cause of the great increase in the sickness and mortality compared with previous periods. Malarious fever prevailed to a considerable extent among

Mauritius. the civil population from January till October 1866; it re-appeared among them in December, and was then also more than usually prevalent among the men of the Royal Artillery at Black River. In 1867 the disease increased rapidly among the civil population, and was extremely fatal. It raged with greatest intensity in April, and then gradually decreased till October. The ratio of deaths in 1867 per 1,000 of the population, is stated to have been 111 from all causes, and 88 from fever for the whole Island; but in Port Louis where the disease was most prevalent and fatal, the death rate for the year amounted to 274 per 1,000.

The progress of the disease among the troops is shown by the following Table of admissions and deaths by fevers in each month, and as the strength varied considerably during the year, the number of men serving on the 1st of each month is also stated:—

	Strength on 1st of Month.	Intermittent and Remittent Fevers.		Continued Fevers.	
		Admitted.	Died.	Admitted.	Died.
January	1,728	58	..	42	1
February	1,725	131	1	78	..
March	1,721	467	1	49	2
April	1,714	522	7	27	2
May	1,698	319	11	12	..
June	1,677	102	..	1	..
July	1,005	69	..	..	..
August	948	32	..	..	..
September	945	34	..	..	..
October	945	32	..	..	..
November	945	62	..	..	..
December	848	141	..	4	..

The disease, as among the civil population, reached the point of greatest prevalence during the year in April, when the admissions for the month amounted to 305 per 1,000 of the strength.

The following Table shows the admissions and deaths by paroxysmal fevers in each of the corps serving in the Island. As three of the regiments were there during a portion of the year only, and as the Artillery were reduced in number by men being sent to the Cape of Good Hope, the calculations to show the relative prevalence of the disease have been made—1st, on the number of men serving in each corps at the beginning of the year, or, in the case of the 32nd Regiment, on its arrival in the Command: and 2ndly, on the average strength for the whole year.

	Strength on 1st of January	Average *Annual* Strength	Intermittent and Remittent Fevers.		Ratio per 1,000				Period of Observation.
					Of Strength on 1st January.		Of Mean *Annual* Strength.		
			Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
									Months.
Royal Artillery ...	203	165	527	1	2,596	4·93	3,194	6·06	12
„ Engineers ...	123	102	284	10	2,309	81·30	2,784	98·04	12
2nd Bn. 13th Regt.	673	292	828	7	1,216	10·40	2,803	23·97	5
2nd „ 22nd „	715	370	210	2	294	2·80	568	5·40	6
32nd Regt. (1st July)	715	354	114	2	160	2·80	322	5·65	6

The Royal Artillery furnished the largest proportion of cases, and the Royal Engineers of deaths. The proportion of cases calculated for the whole year, differed little in the Royal Engineers and 13th Regiment. The 22nd and 32nd Regiments enjoyed a marked exemption from the epidemic, compared

with the other troops; the former from having been quartered at Mahebourg, to which the disease does not seem, at that time, to have extended, and to which the detachments of the regiment were brought in as the disease appeared among them at the outposts, and the latter from having arrived in the Island after the great severity of the epidemic had passed, and being also quartered at Mahebourg. *Mauritius*

When the disease became very prevalent, attempts were made to check it by the removal of the troops from the stations in which it had attacked them. Thus, in February, most of the Royal Artillery were moved to Cannonier Point, but the disease continued to prevail among them till July. On the 1st of April the 13th Regiment was moved from Port Louis to Flat Island, but without any abatement in the amount of fever. Dysentery also broke out among the men there, and as great difficulty was experienced in providing the necessary supplies for the troops and suitable diet for the sick, it was deemed advisable, on the 23rd of May, to bring the regiment back to Port Louis where it remained till it embarked for England on the 7th of June. In May, the Royal Engineers were moved from Port Louis to Pointe D'Essnay, with decided benefit in reducing the amount of fever. There was no occasion to move the 22nd Regiment at Mahebourg, but, as already stated, some of the detachments were recalled from the outposts.

The 32nd Regiment, after being detained a week at Port Louis on disembarkation, moved to Mahebourg leaving behind it 147 men as a garrison at Port Louis. Of 117 cases of fever which occurred in the regiment, 100 were in this detachment and 17 at Mahebourg, and of the latter 12 were clearly traced to have been contracted at P[illegible] Louis.

Owing to these numerous moves, it has been found impossible to prepare any reliable statement of the exact prevalence of fever at each station, but it may be said generally to have prevailed to much the greatest extent in Port Louis and Flat Island, and the least at Mahebourg and Pointe D'Essnay.

From the Quarterly Returns we have calculated the average number constantly in hospital during the year with paroxysmal fevers to have amounted to 59·3 per 1,000 of the strength, showing a loss equal to 21·6 days' service of the whole force, and the average duration of the cases to have been 14·5 days.

For full details of the nature, progress, and probable causes of this epidemic, the reader is referred to the paper by Surgeon-Major Small and Assistant Surgeon Power, of the 13th Regiment, in the volume of these Reports for 1866, p. 442.

Dysentery and Diarrhœa though under the average of the preceding eight years, were more prevalent than in 1866. The increase was due to the occurrence of dysentery in the 13th Regiment at Flat Island, 53 cases, or one-third of all the admissions under that head during the year, having occurred there in the month of May.

Enthetic Diseases were very much less prevalent than in 1866, though slightly above the average of the last eight years.

Dietic Diseases were greatly in excess of the average, and also of the amount in 1866. With one exception the cases were all returned under the head of intemperance (*ebriositas*). Of the 70 cases admitted into hospital, 17 were from the Artillery, and 40 from the Engineers, a fact which may perhaps account for the high rate of mortality from fever in the latter corps. It would seem as if the men had taken to hard drinking to drown care during the prevalence of the epidemic.

The other classes of diseases do not seem to require special notice.

SANITARY REPORT.

The sanitary condition of this station, and the nature and causes of the fever epidemic having been so fully described in a Special Report, published in the last volume, it is considered unnecessary to enter on the subject at the present time.

Section II.

On the Extent of Invaliding.

Mauritius. There were 140 invalids sent to England during the year, and 20 finally discharged the service at Netley; being respectively in the proportion of 108·2 and 15·5 per 1,000 of mean strength.

The following Table, framed from Abstract No. 21 in Appendix, shows the disabilities for which the invalids were sent to England and discharged:—

Disabilities.		Invalids sent Home.	Discharged the Service at Netley.
Dysentery and Diarrhœa		1	..
Ophthalmia		3	3
Paroxysmal Fevers		120	2
Rheumatism		1	..
Venereal Diseases		..	1
Tubercular „		6	5
Diseases of the—			
Nervous System		1	1
Circulatory „		1	2
Respiratory „		1	2
Digestive „		2	1
Integumentary „		1	1
Diseases of Nutrition..		2	..
Accidents and Violence		1	2
Total		140	20
Ratio per 1,000 of Mean Strength	1867 ..	108·2	15·5
	1860-66 ..	38·6	16·9

There has been a very great increase in the proportion of invalids sent to England, due entirely to the epidemic fever which prevailed in the island. The proportion of invalids finally discharged the service, was a little under the average of the preceding seven years.

Section III.

Mean Daily Sick.

The average number constantly sick throughout the year was 124, or 95·83 per 1,000 of the strength; so that nearly one-tenth of the force was non-effective. The following Table gives the usual deductions on this head:—

	1867.	1859–66.
Ratio per 1,000 of Strength constantly Sick	95·83	38·17
	Days.	Days.
Mean Sick-Time to each Soldier	34·98	13·93
Average duration of cases of Disease	15·67	17·10

This Table shows an enormous excess in the ratio constantly sick, and in the mean sick time to each soldier in 1867 compared with the results of the previous eight years, but a decrease of a day and a half in the duration of the cases; results due to the epidemic which prevailed so extensively among the troops, and in a measure, at least, took the place of other diseases. *Mauritius.*

Section IV.

Influence of Age on the Mortality.

Owing to the removal of two regiments in the middle of the year and the incompleteness of some of the returns, we are unable to give the usual information on this head.

IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

1.—White Troops.

Ceylon. On the 8th of December, the 59th Regiment arrived from Ireland to relieve the 2nd Battalion 25th, which embarked, on the 13th December, for Calcutta.

The average strength of the white troops serving in Ceylon during 1867 was 919. There were 1,000 admissions into hospital among them and 13 deaths, of which 3 occurred out of hospital and 2 among the invalids sent to England. These numbers give the proportion of 1,088 admissions, and 14·15 deaths per 1,000 of mean strength, both considerably lower than in 1866.

The following Table, framed from Abstract No. 20 in Appendix, shows the admissions and deaths by classes of diseases :—

Orders.	White Troops .. Diseases.	Strength, 919. Admitted.	Died. At Ceylon.	Died. Of Invalids.	Died. Total	Annual Ratio per 1,000. 1867. Admitted.	1867. Died.	1859–66. Admitted.	1859–66. Died.
	Class I.								
1	Miasmatic Diseases	283	3	..	3	307·9	3·26	610·0	11·47
2	Enthetic „ ..	175	..	..	..	190·4	..	204·8	·14
3	Dietic „ ..	57	..	..	..	62·0	..	35·5	·28
4	Parasitic „ ..	4	..	..	..	4·3	..	5·3	..
	Class II.								
1	Diathetic Diseases ..	10	..	..	..	10·9	..	7·0	·14
2	Tubercular „ ..	21	1	1	2	22·9	2·18	16·9	3·22
	Class III. Diseases of the—								
1	Nervous System..	19	1	..	1	20·7	1·09	49·5	2·65
2	Circulatory „ ..	24	1	..	1	26·1	1·09	20·0	1·12
3	Respiratory „ ..	37	..	..	..	40·3	..	86·9	1·26
4	Digestive „ ..	86	3	..	3	93·6	3·26	144·8	3·22
5	Urinary „ ..	5	..	..	..	5·4	..	5·2	·14
6	Reproductive „ ..	15	..	..	..	16·3	..	17·2	..
7	Locomotive „ ..	3	..	..	..	3·3	..	4·0	·14
8	Integumentary „ ..	124	..	..	..	134·9	..	170·1	..
	Class IV.								
4	Diseases of Nutrition	9	..	1	1	9·8	1·09	8·1	·14
	Class V.								
1	Accidents	127	2	..	2	138·2	2·18	135·8	1·54
4	Suicide	..	..	..	..	..	..	..	·42
6	Corporal Punishment	..	..	..	..	..	..	3·6	..
	Diseases not specified	..	..	..	..	..	..	3·8	..
	Nonappreciable disease	1	..	..	..	1·1	..	·2	..
	Total	1,000	11	2	13	1088·1	14·15	1528·7	25·88

The admissions and deaths were greatly under the previous average. The decrease was chiefly in miasmatic diseases and, as regards the admissions, also in those of the nervous, respiratory, digestive and integumentary systems. *Ceylon.*

MIASMATIC DISEASES were little more than half as prevalent, and one-fourth as fatal as on the average of the eight preceding years. When subdivided they give the following results :—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1867.		1859–66.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	..	..	..	..	·7	·14
Paroxysmal „	42	..	45·7	..	117·1	·98
Continued „	68	..	74·0	..	82·9	1·12
Dysentery and Diarrhœa ..	90	2	97·9	2·18	227·6	6·29
Spasmodic Cholera	1	1	1·1	1·09	4·9	2·38
Sorethroat and Influenza ..	11	..	12·0	..	16·2	..
Ophthalmia	44	..	47·9	..	89·4	..
Rheumatism	21	..	22·8	..	61·5	·14

Paroxysmal and Continued Fevers were very much below the average, and show even a greater reduction if compared with the results for 1866. Continued fevers, which in that year gave rise to a large number of admissions at Colombo, in the 25th Regiment, were not unusually prevalent in the year now under review.

The most marked reduction, however, was in cases of *dysentery and diarrhœa* which gave rise to only one-third of the average rate of mortality. Only one case of *Spasmodic Cholera* occurred, but it proved fatal, at Kandy.

Ophthalmia, though much below the average, furnished exactly the same proportion of admissions as in 1866, and *Rheumatism* was rather more prevalent than in that year.

ENTHETIC DISEASES were considerably more prevalent than in 1866, the increase being in cases of syphilis, and chiefly at Colombo.

DISEASES OF THE NERVOUS SYSTEM.—The reduction in the prevalence of this class was chiefly in cases of *delirium tremens* and *otitis*; but the decrease of the former appears to have been more than compensated by an increase in those admitted under the head of intemperance (*ebriositas*).

DISEASES OF THE DIGESTIVE SYSTEM were more prevalent than in 1866, but the ratio of deaths was lower. Inflammation of the liver is still the most prevalent and fatal disease of this class.

2.—BLACK TROOPS.

The average strength of the Gun Lascars and Ceylon Rifles serving in the Island during the year was 974; the admissions into hospital among them were 898, and the deaths 11, being in the ratio of 922, and 11·30 per 1,000, both considerably lower than in 1866.

The admissions and deaths by the principal classes of diseases are shown in the following Table, framed from Abstract No. 20 in Appendix :—

Ceylon.

Orders.	Black Troops	Strength 974.		Annual Ratio per 1,000 of Mean Strength.			
	Diseases.	Admitted	Died.	1867.		1859–66.	
				Admitted	Died.	Admitted	Died.
	Class I.						
1	Miasmatic Diseases ..	509	4	522·6	4·10	655·8	8·80
2	Enthetic „ ..	24	..	24·7	..	25·2	..
3	Dietic „ ..	3	1	3·1	1·03	1·0	..
4	Parasitic „ ..	40	..	41·1	..	54·9	..
	Class II.						
1	Diathetic Diseases ..	8	1	8·2	1·03	6·1	·52
2	Tubercular „ ..	3	1	3·1	1·03	3·0	1·30
	Class III.						
	Diseases of the—						
1	Nervous System ..	6	..	6·2	..	11·9	·87
2	Circulatory „ ..	..	..	..	..	1·5	·78
3	Respiratory „ ..	84	..	86·2	..	49·3	·78
4	Digestive „ ..	31	2	31·8	2·05	41·3	·70
5	Urinary „ ..	1	..	1·0	..	·4	..
6	Reproductive „ ..	5	..	5·1	..	7·7	..
7	Locomotive „ ..	..	..	..	..	1·2	..
8	Integumentary „ ..	112	..	115·0	..	129·1	..
	Class IV.						
4	Diseases of Nutrition ..	1	1	1·0	1·03	1·3	·17
	Class V.						
1	Accidents	71	..	72·9	..	77·5	·34
4	Suicide	..	..	..	..	·1	·26
6	Corporal Punishment ..	..	..	..	..	·9	..
	Diseases not specified ..	..	1	..	1·03	·8	..
	Total	898	11	922·0	11·30	1069·0	14·52

The admissions and deaths have been considerably under the average, the difference being chiefly in miasmatic diseases. There has been an increase in the admissions by diseases of the respiratory system.

Miasmatic Diseases, when subdivided, give the following results:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1867.		1859–66.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	9	..	9·2	..	9·2	·08
Paroxysmal „	322	..	330·6	..	401·5	1·48
Continued „	..	..	..	..	32·6	·26
Dysentery and Diarrhœa ..	43	4	44·1	4·11	65·0	2·61
Spasmodic Cholera	..	..	..	..	8·7	4·35
Sorethroat and Influenza ..	2	..	2·1	..	2·4	..
Ophthalmia	42	..	43·1	..	68·1	..
Rheumatism	62	..	63·7	..	51·7	..

Eruptive Fevers furnished exactly the average proportion of cases. Eight of the admissions were from measles.

Paroxysmal Fevers were much lower than in 1866, and also much below the average, and there were no admissions from continued fevers.

Dysentery and Diarrhœa were also much under the average as regards prevalence, but the mortality was above it.

ENTHETIC DISEASES continue remarkably low. The reason for this has been fully shown in previous Reports.

DISEASES OF THE RESPIRATORY SYSTEM were considerably more prevalent than usual, but no explanation of the circumstance has been given by the Medical Officer in charge.

DISEASES OF THE DIGESTIVE SYSTEM were much lower than in 1866. The difference was in cases of colic, which still, however, amounted to 18, of which one terminated fatally.

One death appears in the Table under the head of "disease not specified"; it was that of a private who was found dead in bed at Mount Lavinia, having been apparently in good health the previous evening. No *post mortem* examination could be obtained.

Section II.

On the Extent of Invaliding.

Of the white troops, 24 men were sent to England as invalids, and 16 were discharged the Service at Netley during the year, being in the ratio of 26·12 and 17·41 per 1,000 of mean strength. Of the black troops, there were 25, or 25·67 per 1,000 discharged as invalids in Ceylon.

The disabilities for which the men were sent home and discharged are detailed in Abstract No. 21 in Appendix, from which the following classified summary has been framed:—

	White Troops.		Black Troops.
	Invalids sent to England.	Invalids Discharged at Netley.	Discharged as Invalids in Ceylon.
Dysentery and Diarrhœa	1	1	..
Ophthalmia	..	1	5
Rheumatism	..	1	10
Venereal Diseases	2	..	..
Dietic „	..	1	..
Diathetic „	..	1	1
Tubercular „	5	4	..
Diseases of the—			
Nervous System	2	3	2
Respiratory „	2	3	1
Digestive „	2	..	..
Urinary „	1	..	1
Locomotive „	1	1	..
Diseases of Nutrition	7	..	5
Accidents and Violence	1	..	..
Total.. ..	24	16	25
Ratio per 1,000 of Strength { 1867	26·12	17·41	25·67
Ratio per 1,000 of Strength { 1860-66	57·57	24·21	13·70

The invaliding of both classes of troops was much below the average. Diseases of nutrition gave rise to the largest amount of invaliding to England, and were chiefly cases of debility, the result of malarious disease. Among the black troops, rheumatism was the most frequent cause of discharge, but as the cases were chiefly those of men above 40 years of age, this disease was probably assigned as the most prominent cause of inefficiency in men no longer equal to military duty.

Section III.

Mean Daily Sick.

Ceylon. The average number constantly non-effective from sickness during the year was, of the white troops 47, and of the black 33, being respectively in the ratio of 51·14 and 33·88 per 1,000 of mean strength, both considerably lower than in 1866. On these numbers the following calculations have been based :—

	White Troops.		Black Troops.	
	1867.	1859–66.	1867.	1859–66.
Ratio per 1,000 of Strength constantly sick	51·14	72·04	33·88	34·02
	days.	days.	days.	days.
Average sick time to each Soldier	18·67	26·29	12·37	12·42
Average duration of cases of Sickness ..	17·15	17·20	13·41	11·61

The proportion constantly sick of the white troops, in 1867, and the average sick time to each soldier were much below the average of the preceding eight years, but in these respects there was scarcely any change in the black troops. The average duration of the cases among the white troops differed very little from that of the preceding period, but there was an increase of nearly two days among the black troops.

Section IV.

Influence of Age on the Mortality.

The following Table, framed from Abstract No. 23 in Appendix, shows the ratio of deaths per 1,000 living, at each quinquennial period of life among the troops serving in Ceylon :—

Ages	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
White Troops.						
Ratio per 1,000 of Strength { 1867 ..	5·40	12·70	11·19	65·57	..	..
Ratio per 1,000 of Strength { 1860-66	9·52	15·99	29·77	34·74	58·25	142·86
Black Troops.						
Ratio per 1,000 of Strength { 1867 ..	..	9·26	..	11·98	35·93	5·98
Ratio per 1,000 of Strength { 1859–65	9·72	16·42	19·07	14·58	17·19	14·68

This Table shows a rapid increase in the rate of mortality of the white troops with the advance of age ; but the same rule does not apply to the black troops. The decrease in the mortality among the latter at 30, and under 35, may probably be due to the operation of the "Limited Enlistment Act."

Sanitary Report.

No changes of importance have occurred in the Barrack and Hospital accommodation at this station, and no action has been taken regarding the new buildings recommended by the late Commission appointed by the Colonial Government.

X.—ON THE HEALTH OF THE TROOPS IN THE AUSTRALASIAN COLONIES.

Section I.
Sickness and Mortality.

I. Australia and Tasmania.

STATISTICAL REPORT.

Australia. The left wing of the 50th Regiment arrived in Australia from New Zealand on the 10th of August.

The average strength of the troops in Australia and Tasmania during the year was 1,729; the admissions into hospital amounted to 1,284, and the deaths to 13, being respectively in the ratio of 743 and 7·51 per 1,000 of mean strength. One of the deaths occurred out of hospital.

The admissions and deaths by the different classes of diseases are shown in the following Table, framed from Abstract No. 24 in Appendix:—

Average Strength .. 1,729		Australia and Tasmania.							
		1867.						1859–66.	
			Died.			Ratio per 1,000.		Ratio per 1,000.	
Orders.	Classes of Diseases.	Admitted.	In the Colony.	Of Invalids.	Total Deaths.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	233	1	..	1	134·8	·58	204·7	1·92
2	Enthetic „ ..	452	..	..	..	261·4	..	114·0	..
3	Dietic „ ..	74	..	..	..	42·8	..	26·8	·15
4	Parasitic „ ..	14	..	..	..	8·1	..	3·0	..
	Class II.								
1	Diathetic Diseases ..	2	..	..	..	1·1	..	8·5	·29
2	Tubercular „ ..	21	7	..	7	12·1	4·04	15·6	5·31
	Class III. Diseases of the—								
1	Nervous System ..	25	..	..	..	14·5	..	28·9	1·62
2	Circulatory „ ..	8	3	..	3	4·6	1·73	13·0	2·21
3	Respiratory „ ..	112	..	..	..	64·8	..	51·3	·88
4	Digestive „ ..	56	1	..	1	32·4	·58	47·7	·44
5	Urinary „ ..	1	..	..	..	·6	..	4·0	·59
6	Reproductive „ ..	13	..	..	..	7·5	..	2·7	..
7	Locomotive „ ..	3	..	..	..	1·7	..	2·7	..
8	Integumentary „ ..	103	..	..	..	59·6	..	66·3	..
	Class V.								
1	Accidents	157	1	..	1	90·8	·58	105·7	1·18
4	Suicide	..	..	..	..	..	..	..	·29
6	Corporal Punishment	9	..	..	..	5·2	..	2·0	..
	Diseases not specified	..	..	..	..	..	..	9·7	·15
	No appreciable Disease	1	..	..	..	·6	..	·7	..
	Total	1284	13	..	13	742·6	7·51	707·3	15·03

Australia. The ratio of admissions has been 40 per 1,000 above, but of deaths exactly one-half the average of the preceding eight years.

MIASMATIC DISEASES have been one-third below the average. When subdivided they give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength.			
			1867.		1860–66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	4	1	2·3	·58	1·2	..
Paroxysmal „	12	..	6·9	..	4·5	·15
Continued „	21	..	12·1	..	21·1	1·17
Dysentery and Diarrhœa ..	32	..	18·5	..	39·5	·44
Sorethroat and Influenza ..	36	..	20·8	..	40·7	..
Ophthalmia	77	..	44·5	..	42·7	..
Rheumatism	39	..	22·6	..	43·9	..

All the groups of diseases have been much below the average, except eruptive and paroxysmal fevers and ophthalmia, which have very slightly exceeded it. Compared with the results for 1866, there has been an increase in continued fevers (which in that year were extremely rare), and in sorethroat and influenza; but a very marked decrease in dysentery and diarrhœa, ophthalmia, and rheumatism.

ENTHETIC DISEASES were more than double the average, and were also greatly more prevalent than in 1866; the increase was not confined to any form of venereal disease, but was rather greater in the gonorrhœal than the syphilitic group. The Artillery furnished a very small proportion of cases. The highest ratio occurred in a detachment of the 14th Regiment, at Adelaide.

DIETIC DISEASES furnished the same high proportion of admissions as in 1866, all the cases being returned under the head of intemperance (*ebriositas*). Of the 74 admissions, 36 were in the 2nd Battalion 14th Regiment.

TUBERCULAR DISEASES continue the chief cause of mortality.

None of the other classes of diseases seem to require special notice.

SANITARY REPORT.

Deputy Inspector-General Gibb reports that the general health of the troops was very favourable, as might be expected from the salubrious climate of the colonies included in this Command. No epidemic sickness occurred among the men; but measles and scarlatina prevailed among the children.

Among the causes of death enumerated, three were from aneurism, and seven from pulmonary consumption. The large proportion of the latter apparently militates against the truth of the prevalent opinion that the climate exerts a very favourable influence over the course of this disease. The cases of phthisis, however, do not appear to have originated in Australia, but to have arrived in that country with tubercles in their lungs, which, from exposure, intemperance, and other causes, had developed to a fatal termination. Of men invalided, one-half were the subjects of this disease.

The stations occupied by troops in this Command are seaports frequented by ships from different parts of the world, and consequently centres for the rapid propagation of venereal disease. The Senior Medical Officer applied to the Military Authorities to move the Colonial Government to enact a Law similar to the "Contagious Diseases Act," in force in England. A demand on the part of the civil population would soon lead to legislative enactment on this subject.

The sanitary improvements effected in the course of this year in the way of additional buildings were few—consisting of a small hospital of two wards

for the detachment stationed at Brisbane, Queensland; a latrine at Sydney, and some alterations in barrack-rooms at Adelaide. *Australia.*

Some improvement has been made in reducing the number of beds in the barrack-rooms at Melbourne and Sydney, which were overcrowded from want of available accommodation. Dr. Gibb's recommendations on this subject have been carried out to some extent; but there is still insufficient accommodation for the troops.

At *Hobart Town* the barrack accommodation is too limited for the present strength. This has been represented, and huts are about to be erected to rectify the crowded condition of the barracks.

At *Adelaide* the hospital is defective, and the accommodation limited. A proper hospital will have to be built soon, unless the troops occupy the buildings of the present Lunatic Asylum, which will be handed over to them on the completion of the new one.

The most pressing sanitary improvements are required for the Victoria Barracks at *Melbourne*. Some repairs of a pressing nature, which were represented by the Surgeon-Major of the 2nd Battalion 14th Regiment, and by the Sanitary Committee and the Principal Medical Officer, to the Colonial authorities, to whom the barracks belong, have not been carried out; the result will be that several barrack-rooms will become unfit for occupation, and the men will have to be placed under canvas.

The drainage of the extensive swamp in the immediate rear of the barracks, or the proposed modification of it, is another urgent work.

The present hospital (which is temporary) is very defective in site, construction, and accommodation.

The barrack accommodation generally in this Command is not sufficient for the present strength. Taking into consideration the large mortality from phthisis in Australia, a disease often excited and aggravated by the impure air of warm and crowded rooms, it would be very advisable to give a liberal amount of cubic space and superficial area to each soldier. In healthy colonies sanitary suggestions are coldly received, and necessary works delayed; but it would be wise to provide against the consequences of an epidemic visitation such as fever, &c., &c., to which dense populations are liable. Besides, the introduction of cholera is merely a question of time, as it will some day arrive from the increased facilities of commerce and more rapid communication with other countries.

II. New Zealand.

STATISTICAL REPORT.

In the beginning of April the 57th Regiment, in May the 1st Battalion 12th, and in June the detachment of the Military Train, embarked for England; and in the beginning of July the left wing of the 50th Regiment for Australia. The average strength of the troops throughout the year was 1,760; the admissions into hospital were 982, and the deaths 8, being in the ratio of 558 and 4·53 per 1,000 of mean strength. Three of the deaths took place out of hospital. *New Zealand.*

The admissions and deaths were distributed among the different corps as follows:—

New Zealand.

Corps.	Average *Annual* Strength	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Military Train	133	79	..	..	..	..	594	..
1st Bn. 12th Regiment	259	133	2	1	..	3	514	15·44
2nd Bn. 18th „	848	575	2	1	..	3	678	3·53
50th Regt., Left Wing..	202	88	..	..	..	..	440	..
57th „	192	65	..	..	..	..	338	..
Various Staff Corps and Casuals	126	40	1	1	..	2	317	15·87

The admissions and deaths by the different classes of diseases are shown in the following Table, framed from Abstract No. 24 in Appendix :—

Orders.	Average Strength ..	1,760.				Ratio per 1,000 of Mean Strength.			
	Diseases.	Admissions.	Deaths.			1867.		1859–66.	
			In New Zealand.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	246	..	..	..	139·7	..	206·7	2·13
2	Enthetic „ ..	96	..	..	..	54·6	..	25·2	·05
3	Dietic „ ..	28	..	..	..	15·9	..	11·8	·34
4	Parasitic „ ..	11	..	..	..	6·2	..	15·8	..
	Class II.								
1	Diathetic Diseases ..	19	..	..	..	10·8	..	5·1	·11
2	Tubercular „ ..	16	4	..	4	9·1	2·27	8·6	1·70
	Class III.								
	Diseases of the—								
1	Nervous System ..	45	1	..	1	25·6	·56	19·2	·83
2	Circulatory „ ..	22	..	..	..	12·5	..	7·9	1·72
3	Respiratory „ ..	71	..	..	..	40·3	..	51·1	·83
4	Digestive „ ..	64	1	..	1	36·4	·56	32·6	·76
5	Urinary „ ..	7	..	..	..	4·0	..	2·2	·25
6	Reproductive „ ..	12	..	..	..	6·8	..	5·5	..
7	Locomotive „ ..	7	..	..	..	4·0	..	3·6	..
8	Integumentary „ ..	140	..	..	..	79·5	..	70·7	·11
	Class IV.								
4	Diseases of Nutrition ..	..	..	..	..	..	..	·8	..
	Class V.								
1	Accidents .. .	139	2	..	2	107·4	1·14	88·0	2·43
2	In Battle.. .. .	..	..	..	..	..	..	13·2	5·25
3	Homicide ..	..	..	..	..	..	..	·1	·07
4	Suicide	..	..	..	..	..	..	·1	·05
5	Execution .. .	..	..	..	..	..	..	..	·02
6	Corporal Punishment .	9	..	..	..	5·1	..	16·2	..
	Diseases not specified ..	..	..	..	..	..	..	1·7	·05
	Total	982	8	..	8	557·9	4·53	586·1	16·70

The admissions have been under the average of the preceding eight years, but have been higher than in 1866; the excess, as compared with that year, has been chiefly in enthetic and diathetic diseases, and those of the nervous and integumentary systems, and in accidents.

Miasmatic Diseases were much below the average, but differed little from the ratio in 1866. The following Table shows the admissions and deaths by the principal diseases of this class :—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength.			
			1867.		1859–66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	1	..	·5	..	·1	·02
Paroxysmal „	1	..	·5	..	4·2	·05
Continued „	33	1	18·7	·57	32·5	1·05
Dysentery and Diarrhœa ..	39	..	22·1	..	55·6	·87
Sorethroat and Influenza ..	44	..	25·0	..	25·2	..
Ophthalmia	55	..	31·2	..	47·8	..
Rheumatism	45	..	25·5	..	31·0	..

There has been a marked reduction in all these groups except sorethroat and influenza, the admissions by which have been exactly the average.

Enthetic Diseases have given rise to double the average proportion of admissions. This has doubtless arisen from the concentration of the troops in towns previous to their embarkation for England.

Diathetic Diseases were more than double the average. The increase was caused by the admission of 14 cases of lumbago, of which 4 were from the Military Train, and 7 from the 12th Regiment, but no remarks respecting them are made in the Reports.

Diseases of the Nervous System have also been above the average. This has been due to the admission of 14 cases of headache, and 15 of inflammation of the ear. They do not seem to have been of any importance.

Accidents were considerably above the average, owing probably to the movement of the troops previous to embarkation. Only two deaths occurred by this class—both by drowning. Although a portion of the troops was employed on field service in the first two months of the year, there were no casualties from it.

SANITARY REPORT.

Deputy Inspector-General Gibb, previous to leaving the Colony in September, made the following Report :—

The sanitary arrangements were generally satisfactory to the Medical Officers of corps and detachments. A few of the recommendations made last year did not require to be carried out, especially the erections of huts for men under canvas in the Wanganui District, as all the outposts there and in other districts of the Colony have been abandoned.

The greater portion of the force embarked for England in several transports, and the strength in this Colony is now reduced to one battalion of Infantry.

The general sanitary requirements of the Colony, according to Deputy Inspector-General Gibb, are the following :—

1st. That the present cesspit system of latrines in barracks (especially at Auckland) be abolished, and the "dry earth" method substituted. A proposal, recommending the re-construction of the dilapidated latrines at Auckland on the "dry earth system," which had been found to answer so well in the barracks at Sydney, was not entertained, as instructions had been received

New Zealand. from home to reduce the expenditure as much as possible, owing to the reduction of troops in the Command.

2nd. The erection of baths and proper ablution-rooms.

3rd. A systematic encouragement of gardens for soldiers, and the institution of workshops for them, which are particularly adapted to the circumstances of service in this Colony.

Surgeon Young, of the 2nd Battalion 18th Regiment, reports, that in October, his corps was distributed as follows:—The head-quarters and six companies to Auckland; two companies to Napier; and two companies to New Plymouth.

The accommodation for the numbers now quartered at these stations is ample, and the general sanitary condition sufficiently good for the maintenance of health in this climate.

The mortality has been small, and in no way attributable to any preventible causes.

Section II.

On the Extent of Invaliding.

Australasia. There were 49 invalids sent to England from the Australasian Colonies during the year. One invalid was finally discharged the Service in the colonies, and 29 invalids were discharged at Netley. These numbers give the proportion of 14·04 sent home, and 8·60 discharged the Service per 1,000 of mean strength.

The disabilities the of invalids are stated in detail in Abstract No. 25 in Appendix, from which the following classified summary has been framed:—

Mean Annual Strength, 3,489.		Invalids sent to England from Australasia.	Invalids Discharged the Service.	
Classes of Disabilities.			In Australasia.	In England.
Ophthalmia		5	..	4
Dysentery and Diarrhœa		..	.	1
Rheumatism		1	..	2
Diathetic Diseases		..	..	1
Tubercular „		13	..	2
Diseases of the—				
Nervous System		2	..	2
Circulatory „		7	..	3
Respiratory „		8	..	3
Digestive „		5	1	4
Locomotive „		1	..	1
Diseases of Nutrition		1	..	1
Accidents and Violence		6	..	5
Total		49	1	29
Ratio per 1,000 of Mean Strength	1867	14·04	·29	8·31
	1861-6	21·66	3·75	14·84

The proportion of invalids sent home, and of those discharged at Netley, has been much below the average. The results have probably been affected by the number of regiments which returned to England early in the year, bringing with them men who would have been invalided had the corps remained abroad. The men thus brought home, if subsequently discharged, would tend to increase the amount of invaliding of the troops serving in the United Kingdom.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness throughout the *Australasia.* year was 61 in Australia, and 59 in New Zealand. From these numbers we obtain the following results:—

	Australia and Tasmania.		New Zealand.	
	1867.	1859–66.	1867.	1860–6.
Ratio per 1,000 constantly sick ..	35·28	33·31	33·52	34·21
	days.	days.	days.	days.
Average sick time to each soldier ..	12·88	12·16	12·24	12·49
Average duration of cases	17·34	17·26	21·93	21·42

There has been a slight increase in the mean daily sick in Australia. The longer duration of cases in New Zealand would tend to show that the lower ratio of admissions there than in Australia had been chiefly in slight cases which, probably under the circumstances of field service, would not be taken into hospital.

Section IV.

On the Influence of Age on the Mortality.

The following Table, framed from Abstract No. 26 in Appendix, shows the ratio of mortality per 1,000 living, in quinquennial periods of life, among the troops serving in the Australasian Colonies in 1867.

	Under 20 Years.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and Upwards.
Ratio of deaths per 1,000 living .. 1867 ..	..	1·96	4·12	10·65	4·68	..
Ratio of deaths per 1,000 living .. 1859–66	6·44	12·63	17·06	16·71	26·56	46·08

The results for the last eight years show a break in the progressive increase of mortality with the advance of age at the period of 30, and under 35, a result which we have pointed out on several occasions as being probably due to the operation of the "Limited Enlistment Act."

XI.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND JAPAN.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

I. China.

China. The 73rd Regiment landed at Hong Kong from England, on the 3rd March, relieving the 2nd Battalion 20th, which proceeded to the Cape of Good Hope. There was no change during the year in the composition of the Asiatic Force.

1. White Troops.

The average strength of the white troops throughout the year was 723; the admissions into hospital were 1,030, and the deaths 12, including one among the invalids. The proportion of admissions therefore was 1,425, and of deaths 16·59 per 1,000 of mean strength.

The influence of the different classes of diseases on the sickness and mortality is shown in the following Table, framed from Abstract No. 24 in Appendix :—

China.

Order.	Diseases.	Strength	723.				Annual Ratio per 1,000.			
			Admitted.	Died.			1867.		1859-66.	
				In China.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.									
1	Miasmatic Diseases ..		598	9	1	10	827·1	13·83	1218·2	40·50
2	Enthetic „ ..		86	..	..	..	119·0	..	326·6	·05
3	Dietic „ ..		22	..	..	..	30·4	..	37·8	·38
4	Parasitic „ ..		2	..	..	..	2·8	..	8·3	..
	Class II.									
1	Diathetic Diseases ..		11	..	..	..	15·2	..	5·5	·43
2	Tubercular „ ..		25	1	..	1	34·6	1·38	10·0	2·19
	Class III. Diseases of the—									
1	Nervous System ..		33	..	..	..	45·6	..	34·0	2·72
2	Circulatory „ ..		9	..	..	..	12·4	..	9·6	1·24
3	Respiratory „ ..		26	..	..	..	36·0	..	91·7	1·81
4	Digestive „ ..		44	..	..	..	60·9	..	101·7	3·01
5	Urinary „ ..		1	..	..	..	1·4	..	2·3	·09
6	Reproductive „ ..		7	..	..	..	9·7	..	8·3	..
7	Locomotive „ ..		10	..	..	..	13·8	..	4·1	..
8	Integumentary „ ..		47	..	..	..	65·0	..	118·8	·14
	Class IV.									
4	Diseases of Nutrition ..		4	..	..	..	5·5	..	20·5	·52
	Class V.									
1	Accidents		105	1	..	1	145·2	1·38	88·8	3·34
2	Battle		..	..	..	..	..	..	·5	·14
3	Homicide		..	..	..	..	..	..	..	·23
4	Suicide		..	..	..	..	..	..	..	·48
6	Corporal Punishment ..		..	..	..	..	..	..	4·0	..
	Diseases not specified ..		..	..	..	..	..	..	14·6	·19
	Total		1,030	11	1	12	1424·6	16·59	2107·3	57·46

The admissions and deaths have been greatly below the average, the reduction being most marked in miasmatic and enthetic diseases, and in those of the respiratory, digestive and integumentary systems.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases in this class were as follows:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength.			
			1867.		1859-66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	1	..	1·4	..	2·6	·40
Paroxysmal „	267	5	369·3	6·91	578·9	7·60
Continued „	101	1	139·7	1·38	239·9	4·35
Dysentery and Diarrhœa	165	3	228·2	4·15	257·1	16·94
Spasmodic Cholera	..	..	..	..	14·2	8·34
Sorethroat and Influenza	12	..	16·6	..	15·3	..
Ophthalmia	13	..	18·0	..	77·0	..
Rheumatism	18	..	24·9	..	56·5	·10

China. *Paroxysmal Fevers* have been much below the average in frequency, and a little under it in point of mortality. *Continued Fevers* have also been greatly below the average, and there has been a reduction to the extent of two-thirds in the mortality by them.

Dysentery and Diarrhœa show a slight decrease in amount, and the ratio of deaths has been only one-fourth of the average of the preceding eight years. There was no case of *spasmodic cholera* among the white troops. There has been a great reduction also in the amount of *ophthalmia* and *rheumatism*.

This improvement in the health of the troops is attributed by the Principal Medical Officer to "the increased space given them in barracks, the moderate amount of night duty, good diet, and general attention to sanitary arrangements." It is to be hoped the improvement may be permanent; so far as it goes it is extremely satisfactory, the sickness and mortality having been lower than in any year since Hong Kong was first occupied as a military station.

ENTHETIC DISEASES have been much below the average. The reduction has been most marked in, but has not been confined to, cases of primary syphilis, and has been probably the result of a more strict enforcement, by the police, of a local Act for the prevention of contagious diseases, which has been in operation at Hong Kong for the last ten years.

DISEASES OF THE INTEGUMENTARY SYSTEM.—There has been a great reduction in the amount of these diseases, chiefly in cases of boils (*phlegmon*) and ulcers.

ACCIDENTS.—The admissions under this head were greatly above the average, principally from contusions and sprains, but they were mostly of a trifling character. The only death in the class was by drowning.

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2. NATIVE OR ASIATIC TROOPS.

The average strength of these troops, which consisted of a company of Gun Lascars and four companies of the Ceylon Rifles, was 425; the admissions into hospital were 651, and the deaths 26, being respectively in the ratio of 1,532 and 61·17 per 1,000 of strength, both greatly in excess of the average, and the mortality nearly four times as high as among the European troops.

The diseases by which this sickness and mortality were caused, are stated in detail in Abstract No. 24 in Appendix, from which the following classified summary has been framed:—

Orders.	Diseases.	Admissions.	Deaths.	Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1861–66. Admitted.	1861–66. Died.
	Average Strength ..	425.					
	Class I.						
1	Miasmatic Diseases ..	395	5	929·4	11·76	856·2	15·10
2	Enthetic „ ..	48	..	112·9	..	92·2	·58
3	Dietic „ ..	..	..	..	..	1·5	..
4	Parasitic „ ..	14	..	32·9	..	14·8	..
	Class II.						
1	Diathetic Diseases ..	28	11	65·9	25·88	11·1	·35
2	Tubercular „ ..	2	1	4·7	2·35	3·2	1·27
	Class III. Diseases of the—						
1	Nervous System	3	..	7·1	..	17·3	·12
2	Circulatory „	2	2	4·7	4·71	·6	·46
3	Respiratory „	51	2	120·0	4·71	78·5	2·67
4	Digestive „	18	..	42·4	..	46·8	·81
5	Urinary „	4	..	9·4	..	1·7	..
6	Reproductive „	10	..	23·5	..	2·1	·12
7	Locomotive „	..	..	..	..	2·1	·12
8	Integumentary „	52	..	122·4	..	58·8	..
	Class IV.						
4	Diseases of Nutrition	6	4	14·1	9·41	20·4	2·79
	Class V.						
1	Accidents	18	1	42·4	2·35	56·9	·46
2	Battle	..	..	..	..	1·5	·12
3	Homicide	..	..	..	..	..	·12
4	Suicide	..	..	..	..	..	·23
5	Execution	..	..	..	..	..	·12
6	Corporal Punishment.	..	..	..	..	·9	..
	Diseases not specified	..	..	..	..	·6	..
	Total ..	651	26	1531·8	61·17	1267·2	25·44

The ratio of admissions, though considerably lower than in 1866, was greatly in excess of the average, that of the deaths was 36 per 1,000 above the average, and 19 per 1,000 above the ratio in 1866. The excess of the admissions was chiefly in miasmatic, enthetic, and parasitic diseases, and in those of the respiratory and integumentary systems, and of the deaths in diathetic diseases and diseases of nutrition.

Miasmatic Diseases.—The admissions and deaths by the principal diseases of this class were as follows:—

China.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength.			
			1867.		1861-66.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers ..	56	2	131·8	4·70	3·8	·27
Paroxysmal ,, ..	145	..	341·2	..	598 4	2·72
Continued ,, ..	29	..	68·2	..	46·0	1·91
Dysentery and Diarrhœa	63	3	148 2	7 06	18·9	8 04
Spasmodic Cholera ..	..	..	..	..	14·7	4·22
Sorethroat and Influenza	2	..	4·7	..	7 6	..
Ophthalmia	3	..	7·1	..	13·5	..
Rheumatism	79	..	185·9	..	120·5	·27

Eruptive Fevers were extremely prevalent among the Asiatic troops during the first quarter of the year; 43 cases of smallpox, of which 2 died, and 10 cases of chicken-pox occurred in the Ceylon Rifles, and 3 cases of smallpox among the Gun Lascars. Of the men attacked by smallpox 28 are stated to have borne good marks of vaccination, and 15 marks of previous attacks of smallpox; in three of the latter it is stated to have been the third attack.

Paroxysmal Fevers were considerably under the average among this class of troops in the Command, and were a little below the proportion which would have occurred among the men of the Ceylon Rifles had they been serving in Ceylon.

Dysentery and Diarrhœa were also below the average, but were more than twice as prevalent as in the same corps in Ceylon.

Rheumatism was much in excess of the average. The Medical Officer in charge states that almost all the cases of chronic rheumatism were due to a syphilitic taint.

Enthetic Diseases were above the average, but were one-third less than in 1866. The reduction took place in cases of syphilis.

Diathetic Diseases.- The admissions by this class of diseases amounted to six times the average, and the deaths were in the ratio of 26 per 1,000 of the strength. The excess was chiefly due to cases of general dropsy (*anasarca*), but one death occurred also from beri beri and one from anæmia. All but two of the cases, and all the deaths, were in the Ceylon Rifles. The prevalence of *anasarca* among the men is attributed by the Surgeon to their mode of living. The detachment consisted of two companies of Malays and two of Tamils, chiefly of the Hindoo religion; the former eat any kind of animal food, the latter live principally on fish and vegetables. All the cases of *anasarca* are stated by the Medical Officer to have occurred in the Tamil companies, and he concludes that Hindoos are not at all adapted for service in Hong Kong.

Diseases of the Respiratory System were above the average chiefly from the prevalence of bronchitis, and those of the Integumentary System from abscesses and ulcers.

Diseases of Nutrition furnished a large proportion of deaths. The cases appear to have been analogous to tho e already noticed under *anasarca*, and to have been due to the same cause, all of them having occurred in the Tamil company.

SANITARY REPORT.

Deputy Inspector-General Heffernan reports that there has been a general complaint as to the lighting of all the barracks and hospitals in Hong Kong at night.

This defect, he says, he can corroborate, as the present plan of lighting them with oil is both unwholesome and inefficient. It would conduce very much to the comfort of the soldier, and the healthiness of the barracks, if gas was

introduced into all these buildings. This is a subject that has already been brought to the notice of the Home Authorities, but it is said to be objectionable on the score of the expense. All the streets and most of the public buildings are lit with gas, except those under the War Department. *China.*

There has been little to complain of in a sanitary point of view, except small details that were easily rectified. This has mainly arisen from so much having been done during the last two years.

The leading sanitary improvements effected in the course of the year were—

Complete new latrines and urinals have been erected in the Murray Barracks, upon the most improved plan.

New verandahs have been constructed all round the North Barracks, occupied by the Royal Artillery.

The floor of the east guard-house has been raised, thereby adding very much to the healthiness of the post.

New Purveyor's Stores have been built at the Garrison Hospital. Some old sheds to the west of it have been removed, as they were of no use and impaired the ventilation. A new surface drain has been made near the West Wing.

Three blocks of new barracks, in a very healthy situation, have been completed, making an addition that was much required to the permanent barracks of the station. Owing, however, to the want of authority from the War Office, cook-houses, latrines, &c., have not yet been built, and consequently the barracks cannot be occupied; the additional accommodation is much required

As the food of the Hindoo soldiers of the Ceylon Rifles has been considered insufficient to keep them in health, 20 ozs. of mutton every ten days has been given, as a free ration, to each man, instead of the ½ lb. dholl and 1 oz. of ghee, formerly issued as a daily ration, but which they did not seem to care for.

Great attention has been paid during the year to the clothing and duties of the troops, so as to meet the varying circumstances of the weather and season of the year.

Particular notice has also been taken of any local deficiencies of drains.

Very extensive repairs to most of the public buildings have been necessitated, owing to the damage done to them by the typhoons that visited Hong Kong in the month of September.

There is still a great want of proper quarters for married soldiers. Among the general deficiency of barracks, involving the use of hired buildings that are unsuited to the purpose, this is one of the most urgent, and requires immediate attention.

Upon the whole, the troops have been remarkably healthy, both the number of admissions and the deaths having been considerably lower than in almost any other year since Hong Kong has been occupied. This remark, however, applies more to the white than the black troops, the mortality among the latter having been about four times greater, in proportion to their numbers, than among the former.

II. JAPAN.

The average strength of the garrison, which consisted of the 2nd Battalion 9th Regiment, with detachments of Royal Artillery and Engineers and of the 20th and 73rd Regiments during part of the year, amounted to 773; the admissions into hospital were 1,135, and the deaths 9, of which 3 occurred out of hospital. These numbers give the proportion of 1,468 admissions, and 11·63 deaths per 1,000 of mean strength, both lower than in 1866. *Japan.*

Japan. The influence of the different classes of diseases in causing this sickness and mortality, is shown in the following Table framed from Abstract No. 24 in Appendix :—

Orders.	Diseases.	Average Annual Strength, 773.		Ratio per 1,000.			
				1867.		1864–6.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases	253	..	327·3	..	651·3	14·82
2	Enthetic „	616	..	796·9	..	435·1	..
3	Dietic „	14	1	18·1	1·29	26·1	..
4	Parasitic „	14	..	18·1	..	10·9	..
	Class II.						
1	Diathetic Diseases	7	..	9·0	..	1·3	..
2	Tubercular Diseases.. ..	3	..	3·9	..	9·6	·87
	Class III. Diseases of the—						
1	Nervous System	14	2	18·1	2·59	16 1	·44
2	Circulatory „	1	..	1·3	..	3·0	1·74
3	Respiratory „	16	1	20·7	1·29	51·9	3·05
4	Digestive „	18	2	23·3	2·59	35·3	·44
5	Urinary „	4	1	5·2	1·29	3·5	·44
6	Reproductive „	14	..	18·1	..	12·6	..
7	Locomotive „	5	..	6·5	..	6·1	..
8	Integumentary „	63	..	81·5	..	156·9	..
	Class IV.						
4	Diseases of Nutrition ..	4	..	5·2	..	15·3	..
	Class V.						
1	Accidents	85	1	110·0	1·29	153·9	3·49
3	Homicide	..	1	..	1·29	..	..
4	Suicide	..	..	..	..	..	·87
5	Corporal Punishment ..	4	..	5·2	..	3·5	..
6	Malingering	..	..	..	..	2·6	..
	Total	1,135	9	1468·4	11·63	1595·0	26·16

The admissions were considerably under the average, the reduction being most marked in miasmatic diseases and those of the integumentary system, and in accidents; but this was to great extent neutralized by the large increase in the amount of venereal diseases.

Miasmatic Diseases furnished only half the proportion of cases admitted during the previous three years. When subdivided they give the following results :—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000. 1867. Admitted.	1867. Died.	1864-6. Admitted.	1864-6. Died.
Eruptive Fevers	23	..	29·8	..	20·9	1·74
Paroxysmal „	28	..	36·2	..	221·4	..
Continued „	26	..	33·6	..	127·3	3·49
Dysentery and Diarrhœa ..	9	..	11·6	..	77·6	4·36
Spasmodic Cholera	..	..	..	..	5·6	4·79
Sorethroat and Influenza ..	6	..	7·8	..	41·4	·44
Ophthalmia	51	..	66·0	..	67·2	..
Rheumatism	95	..	122·9	..	76·3	..

Eruptive Fevers.—The proportion of admissions by this class was very high. All the cases were of smallpox, which is endemic in Yokohama. There were no deaths, the men being all protected by vaccination. It is remarkable that in the only two cases in which the disease presented the confluent form the men bore not only marks of vaccination, but also of previous smallpox.

Paroxysmal and Continued Fevers and *Diarrhœa and Dysentery* were all very much under the average of the preceding three years, but in these the ratio had been greatly above what was due to the climate of Japan, owing to the state in which the troops had arrived at the station from China. During 1867 there was no change of regiment, and the men had at the beginning of the year in a great measure got rid of the effects of their previous service in Hong Hong.

Rheumatism was much above the average. It is stated to be very prevalent in Japan among both Europeans and natives, and is attributed to the great and sudden variations of temperature; in many of the cases however it was of syphilitic origin.

Enthetic Diseases gave rise to the enormously high proportion of 797 admissions per 1,000 of mean strength; 603 being of the syphilitic and 194 of the gonorrhœal group. From the data furnished by the Quarterly Returns we have obtained the following results respecting venereal diseases.

1867.	Ratio per 1,000 constantly Non-effective.	Average Sick Time to each Man serving.	Average Duration of Cases.
		Days.	
Syphilitic Group	52·2	19·07	31·70
Gonorrhœal Group ..	7·7	2·80	14·67
Total Venereal Diseases	59·9	21·87	27·36

There was thus the very large proportion of 6 per cent. constantly under treatment for these diseases, and the loss of service caused by them was equal to nearly 22 days for the whole force at the station. Exclusive of this class, the admissions into hospital amounted only to 671 per 1,000 of the strength, and there was nothing in the prevalence of the other classes of diseases which calls for special remark, except perhaps the high ratio of admissions under the head of accidents. Of 74 cases in this class, 48 were of wounds and contusions many of which were the result of intemperance. The homicidal death was that of a soldier who was stabbed by a comrade in his quarters in Camp, and died of hæmorrhage in a few minutes.

Section II.

On the Extent of Invaliding.

China and Japan.

During the year there were 46 invalids of the white troops sent to England and 20 of the Asiatic to Ceylon, and 24 invalids were finally discharged the Service at Netley. These numbers give the proportion of 30·75 sent home, and 16·04 discharged the Service as invalids of the white, and 47·06 sent to Ceylon of the Asiatic troops.

The following Table, framed from Abstract No. 25 in Appendix, shows the classes of disabilities of the invalids :—

	White Troops		Asiatic Troops
Mean Strength..	1,496		425
	Sent as Invalids to England.	Discharged as Invalids in England.	Sent as Invalids to Ceylon.
Paroxysmal Fevers	6	..	..
Dysentery and Diarrhœa ..	..	2	1
Ophthalmia	2	2	..
Rheumatism	3	..	7
Venereal Diseases	7	1	..
Diathetic „	1	..	3
Tubercular „	8	8	1
Diseases of the—			
Nervous System	3	1	..
Circulatory „	2	3	..
Respiratory „	1	..	2
Digestive „	9	3	..
Locomotive „	3	3	..
Integumentary „	..	..	1
Diseases of Nutrition	..	..	5
Accidents and Violence ..	1	1	..
Total	46	24	20
Ratio per 1,000 of Strength .. 1867 ..	30·75	16·04	47·06
Strength .. 1861-6..	59·71	24·50	18·94

The invaliding of the white troops was greatly below the average, but that of the Asiatic was much above it. It must be borne in mind, however, that the description of the latter in the two periods was entirely different ; during the first period this force consisted of regiments of native troops from India, but in 1867 of a wing of the Ceylon Rifles.

Section III.

Mean Daily Sick.

The mean daily sick of the European force in China during the year was 47, and in Japan 73 ; and that of the Asiatic force in Hong Kong was 31 : from these numbers the following results have been obtained :—

		European Force.		Asiatic Force.
		China.	Japan.	China.
Ratio per 1,000 of Strength constantly Sick	1867..	65·01	99·61	72 94
	1861-6	81·01	77·58*	49·73
		days.	days.	days.
Average Sick Time to each Soldier ..	1867..	23·73	35·36	26·62
	1861-6	29·57	28·31*	18·15
Average duration of Cases	1867..	16 66	24 76	17·38
	1861-6	15·12	18·13*	14 32

* For 1865 and 1866 only.

The mean daily sick and average sick time to each soldier have been considerably under the average among the European troops in Hong Kong, but there has been a slight excess in the duration of the cases. Among the Asiatics at Hong Kong, however, and the Europeans in Japan, there has been a very marked increase; among the latter, as has been already shown, this has been due to the great prevalence of venereal diseases.

Section IV.

Influence of Age on the Mortality.

The following Table shows the numbers living and the deaths at each age of the troops serving in China and Japan in 1867, those corps only being included which were in that Command during the whole year :—

	European Troops.											
	Under 20.		20 and under 25		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery	..	..	12	1	25	..	25	..	10	..	2	..
2nd Bn. 9th Regt. ..	4	..	66	..	445	6	108	1	24	2	..	..
Total	4	..	78	1	470	6	133	1	34	2	2	..
Ratio of Deaths per 1,000 .. 1867..	..		12·88		12 77		7·56		58·83		..	
1861-6	7·16		38·68		64·29		62·29		148·09		167·50	
	Asiatic Troops.											
Gun Lascars	4	..	26	..	27	3	21	1	3	1	..	..
Ceylon Rifles.. ..	44	1	77	4	46	2	65	2	98	10	25	2
Total	48	1	103	4	73	5	86	3	101	11	25	2
Ratio per 1,000 ..	20·83		38 83		68·34		34 89		108·91		80·00	

China and Japan.

The returns of the European troops for 1867 do not show an increase of mortality with the advance of age up to 35 years, but it must not be forgotten that the numbers are too small to ensure average results, and that they apply chiefly to the troops in Japan.

The returns for the Asiatic troops show a great increase with the advance of age, except for the period 30 and under 35, when the results are probably affected by the operation of the Limited Enlistment Act. There are no returns of the ages of the Asiatic troops for previous periods, and the numbers for one year are too limited to justify positive deductions.

XII. ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

Section I.

Sickness and Mortality.

India.

The average strength of the European troops serving in India in 1867 was 56,896; the admissions into hospital amounted to 78,434, and the deaths to 1,529; to the latter must be added 113 which occurred among the invalids on their passage home and at Netley, making the total deaths 1,642. These numbers give the proportion of 1,379 admissions, and 28·86 deaths per 1,000 of mean strength; the former rather lower, and the latter one-third higher than the ratio in 1866. The admissions have been nearly one-fifth under, but the deaths ·48 per 1,000 above the average of the preceding seven years.

The following Table shows the admissions and deaths in each of the Presidencies separately:—

	Average Strength.	Admissions into Hospital.	Deaths.			Ratio per 1000 of Mean Strength.			
						1867.		1860–66.	
			In India.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
Bengal	34,237	48,172	1,094	67	1,161	1,407	33·91	1,740	30·22
Madras	10,793	14,963	207	24	231	1,387	21·40	1,396	22·09
Bombay	11,866	15,294	228	22	250	1,289	21·07	1,607	23·69

The ratio of admissions was lower than in 1866 in all the Presidencies, but that of deaths was higher in Bengal and Bombay, and lower in Madras.

The admissions were under the average of the preceding seven years in all the Presidences, though the difference in Madras was very trifling. The deaths were above the average in Bengal, but below it in Madras and Bombay.

I. Bengal.

STATISTICAL REPORT.

Bengal.

During the year 1867 the mean strength of the European troops in the Bengal Presidency was 34,237; the admissions into hospital among them amounted to 48,172, and the deaths to 1,094, to which must be added 67 among the invalids sent to England, making a total of 1,161. The admissions, therefore, were in the ratio of 1,407, and the deaths of 33·91 per 1,000 of the strength. The admissions were rather lower, but the deaths nearly 11 per 1,000 higher than in 1866, and 3·69 per 1,000 above the average of the last seven years.

The admissions and deaths by the different diseases are stated in Abstract No. 27 in Appendix, from which the following classified Table has been framed:—

Bengal.

Orders.	Diseases.	1867. Strength, 34,237. Admitted.	Died. In India.	Died. Of Invalids.	Died. Total.	1867. Ratio per 1,000. Admitted.	1867. Ratio per 1,000. Died.	1860–66. Ratio per 1,000. Admitted.	1860–66. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	25,432	667	18	685	742·8	20·01	954·6	16·44
2	Enthetic „ ..	5,612	3	3	6	163·9	·17	281·8	·35
3	Dietic „ ..	725	7	..	7	21·2	·20	11·2	·18
4	Parasitic „ ..	335	..	..	..	9·8	..	8·1	..
	Class II.								
1	Diathetic Diseases ..	398	9	2	11	11·6	·32	7·6	·21
2	Tubercular „ ..	377	54	25	79	11·0	2·31	11·0	2·52
	Class III. Diseases of the—								
1	Nervous System ..	1,187	45	3	48	34·7	1·40	34·8	1·94
2	Circulatory „ ..	436	39	5	44	12·7	1·29	10·0	·96
3	Respiratory „ ..	1,713	41	2	43	50·0	1·26	55·3	1·14
4	Digestive „ ..	4,273	108	4	112	124·8	3·27	135·8	3·77
5	Urinary „ ..	87	4	2	6	2·5	·17	2·7	·17
6	Reproductive „ ..	553	..	..	..	16·2	..	15·1	·01
7	Locomotive „ ..	195	..	..	..	5·7	..	5·7	·02
8	Integumentary „ ..	2,946	..	..	..	86·1	..	105·7	·06
	Class IV.								
4	Diseases of Nutrition.	446	3	..	3	13·0	·09	9·0	·21
	Class V.								
1	Accidents	3,406	100	3	103	99·5	3·01	86·9	1·53
2	Battle..	..	..	..	..	..	..	·6	·19
3	Homicide	3	1	..	1	·1	·03	..	·02
4	Suicide	6	13	..	13	·2	·38	·1	·30
5	Execution	..	..	..	..	..	..	..	·01
6	Corporal Punishment	18	..	..	..	·5	..	1·1	..
	Diseases not specified.	24	..	..	..	·7	..	3·4	·19
	Total	48,172	1,094	67	1161	1407·0	33·91	1740·5	30·22

The reduction in the admissions compared with the results for 1866 has been chiefly in enthetic, and compared with the average of previous years in miasmatic and enthetic diseases. The increase in the ratio of mortality has been caused by miasmatic diseases.

Miasmatic Diseases.—The admissions were slightly higher than in 1866, but were 212 per 1,000 below the average of the last seven years. The mortality however was 3½ per 1,000 above that average. The admissions and deaths by the principal diseases comprised in this class were as follows:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 Strength. 1867. Admitted.	1867. Died.	1860–66. Admitted.	1860–66. Died.
Eruptive Fevers..	43	4	1·3	·12	2·6	·34
Paroxysmal ,, ...	13,336	58	389·5	1·69	484·4	2·19
Continued ,, ...	2,663	31	77·8	·90	141·0	1·47
Dysentery and Diarrhœa	4,524	106	132·1	3·10	139·1	3·77
Spasmodic Cholera..	675	464	19·7	13·55	12·8	7·85
Sorethroat and Influenza	659	1	19·2	·03	20·8	·02
Ophthalmia	1,097	..	32·0	..	51·3	..
Rheumatism	2,029	2	59·3	·06	71·7	·07

Eruptive Fevers furnished only half the average proportion of cases. Of the 43 admissions, thirty were caused by smallpox, and four of them died, two at Cawnpore, one at Dinapore, and one at Sealkote. In all the cases the men are stated to have borne marks of previous vaccination.

Paroxysmal and Continued Fevers were much below the average of the preceding seven years. The admissions and deaths however by paroxysmal fevers were higher than in 1866, but the ratio in that year was extremely low; in continued fevers there was a slight reduction.

Dysentery and Diarrhœa were slightly in excess of the proportion in 1866, but under the average of the seven years.

Spasmodic Cholera was the cause of the high rate of mortality by miasmatic diseases. The admissions and deaths were greatly in excess of any of the preceding five years; they did not differ materially from the proportion in 1860; and the admissions amounted only to half and the deaths to a little more than half the ratio in the epidemic of 1861. The Peshawur, Meerut, Lahore, and Sirhind Divisions suffered most.

Enthetic Diseases were one-fifth lower than in 1866, and two-fifths under the average of the last seven years. The reduction has been most marked in, though not confined to, cases of syphilis. The reduction is probably due to the regulations for the repression of contagious diseases enacted in 1866. The reduction has been nearly alike in syphilitic and gonorrhœal affections.

Accidental and Violent Deaths.—The ratio of deaths by this class was double the average, and was higher than in 1866. The chief cause of this was sunstroke, by which 71 out of the 117 deaths reported were occasioned; in the preceding year they amounted to 50. This excess was attributed by some of the Medical Officers to the exposure of the men in the cholera camps during the hot season. Exclusive of these the accidental deaths amounted to 29, the homicidal to 1, and the suicidal to 13.

The following Table shows the admissions and deaths during the year at each of the principal stations in the Bengal Command:—

Bengal.

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.
Presidency..	Calcutta	770	1,318	8	1,712	10·39
	Dum Dum	404	566	6	1,401	14·85
	Barrackpore	394	720	8	1,827	20·35
	Chinsurah	267	434	16	1,625	59·92
	Berhampore	96	197	1	2,052	10·42
	Hazareebaugh	701	894	5	1,275	7·13
Eastern Frontier Brigade	Senchal	451	289	4	641	8·67
	Jallapahar	53	47	1	887	18·87
	Darjeeling	13	11	..	846	..
Allahabad ..	Allahabad	1,034	1,632	35	1,578	33·85
	Cawnpore	711	968	19	1,361	26·72
	Dinapore	909	1,227	16	1,350	17·60
	Benares	601	1,076	7	1,790	11 65
Oude ..	Lucknow	2,388	2,892	35	1,211	14·66
	Seetapore	494	451	14	913	28·34
	Roy Bareilly	343	278	6	810	17·49
	Fyzabad	881	718	11	815	12·49
Saugor ..	Saugor	658	1,395	10	2,120	15·20
	Nagode	204	258	5	1,265	24·51
	Nowgong	195	213	4	1,092	20·51
	Jubbulpore	656	1,307	16	1,992	24·39
Rohilcund ..	Bareilly	802	814	11	1,015	13·72
	Shahjehanpore	412	719	23	1,745	55·83
	Moradabad	260	367	7	1,411	26·92
Gwalior ..	Morar	884	1,942	33	2,197	37·33
	Fortress Gwalior ..	218	354	11	1,624	50·46
	Jhansi	612	1,389	11	2,270	17·97
	Seepree	88	175	..	1,989	..
Meerut ..	Meerut	1,596	2,420	143	1,516	89·60
	Agra	982	1,318	19	1,342	19·35
	Delhi	397	637	14	1,604	35·26
	Muttra	353	251	3	711	8·50
	Roorkee	311	701	12	2,254	38·59
	Futtyghur	285	410	4	1,439	14·03
Sirhind ..	Umballah	1,226	1,740	35	1,419	28·55
	Jullundur	5,529	494	15	934	28·35
	Dugshai	625	609	4	974	6·40
	Phillour	91	174	5	1,912	54·94
	Subathoo	506	839	25	1,658	49·41
Lahore ..	Meean-Meer	1,142	2,468	82	2,161	71·80
	Fort Lahore	143	435	7	3,042	48 95
	Umritsir	52	61	..	1,173	..
	Fort Kangra	73	87	1	1,192	13·70
	Fort Govindghur ..	134	185	4	1,381	29 85
	Sealkote	1,227	1,645	9	1,341	7·33
	Ferozepore	719	1,099	19	1,528	26·43
	Mooltan	741	613	10	827	13·50
Peshawur ..	Peshawur	1,507	3,290	191	2,183	126·74
	Rawul Pindee	1,477	1,744	13	1,181	8·80
	Campbellpore	403	439	9	1,089	22·33
	Attock	180	264	4	1,467	22·22
	Nowshera	707	1,124	18	1,590	25·46
	Dera Ismael Khan ..	101	66	..	653	..
	Murree	401	324	19	808	47·38
Troops on March, detached, &c.		1,616	1,494	20	924	12·38
Convalescent Stations and Depôt Hospitals		1,715	1,897	96	1,106	55·98

The admissions were much above the average at Berhampore, Saugor, Morar, Jhansi, Roorkee, Meean Meer, Fort Lahore, and at Peshawur; and the mortality was excessive at Chinsurah, Shahjehanpore, Fortress Gwalior, Meerut, Phillour, Subathoo, Meean Meer and Fort Lahore, Peshawur, and Murree. *Bengal.*

The influence of the different classes of diseases in causing admissions into hospital and deaths is shown in the following Table:—

Bengal.

Class	Diseases.	Presidency.		Eastern Frontier Brigade.		Allahabad.		Oude.		Saugor.		Rohilcund.		Gwalior.		Meerut.		Sirhind.		Lahore.		Peshawur	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Average Strength	2,664		519		3,259		4,115		1,719		1,491		1,810		3,939		2,987		4,270		4,800	
	Class I.																						
1	Miasmatic Diseases	1,756	21	114	1	2,059	38	1,669	27	1 913	14	736	31	2,446	24	2 960	145	2,134	59	3,869	80	4,644	196
2	Enthetic ,, ...	603	...	35	...	868	...	804	...	287	...	350	...	283	...	836	...	326	...	679	...	429	...
3	Dietic ,, ...	119	...	1	...	73	1	157	2	18	1	19	...	76	1	70	1	41	...	67	...	72	1
4	Parasitic ,, ...	27	...	8	...	29	...	38	...	21	...	12	...	23	...	33	...	43	...	33	...	63	...
	Class II.																						
1	Diathetic Diseases	36	3	2	...	47	...	50	...	15	...	34	...	53	...	31	1	22	...	31	2	64	...
2	Tubercular ,, ...	51	2	10	1	38	7	56	5	15	3	21	...	11	...	65	10	28	5	50	6	27	6
	Class III.																						
	Diseases of the—																						
1	Nervous System	181	3	11	...	114	1	136	6	75	1	66	1	72	6	137	6	70	3	169	2	152	6
2	Circulatory ,, ...	28	1	5	1	60	3	69	5	18	4	26	3	19	2	62	2	43	2	83	5	24	8
3	Respiratory ,, ...	130	1	19	...	129	2	139	4	106	2	80	1	103	...	217	6	173	5	303	5	200	5
4	Digestive ,, ...	458	7	67	1	480	14	405	7	242	5	205	2	270	3	506	11	369	7	418	6	500	16
5	Urinary ,, ...	11	...	1	...	15	1	13	...	9	1	3	...	5	1	8	1	3	...	7	...	12	...
6	Reproductive ,, ...	66	...	9	...	59	...	60	...	40	...	29	...	22	...	92	...	61	...	56	...	63	...
7	Locomotive ,, ...	14	...	...	...	17	...	39	...	14	...	9	...	5	...	26	...	24	...	9	...	27	...
8	Integumentary ,, ...	281	...	17	...	460	...	328	...	197	1	173	...	154	...	303	...	194	...	370	...	320	...
	Class IV.																						
4	Diseases of Nutrition	50	2	6	1	83	...	35	...	31	...	12	...	32	...	46	1	41	...	49	1	68	...
	Class V.																						
1	Accidents	307	4	51	...	367	10	349	6	179	2	134	3	279	16	346	10	315	2	506	25	518	14
3	Homicide	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	...	...	...	...	...	1	4	...	...	...	...	1	2	...	1	...	1	...	...	3	2
6	Corporal Punishment	...	...	...	...	2	...	1	...	...	...	...	...	...	...	4	...	3	...	1	...	1	...
	Diseases not specified	11	...	...	...	3	...	4	...	1	...	2	...	6	...	4	...	1	...	8	...	7	...
	General Total	4,129	44	247	5	4,003	77	4,353	66	3,181	35	1,920	41	3,860	55	5,746	195	3,871	84	6,606	182	7,214	254

RATIO per 1,000 of Mean Strength.

Class.	Military Divisions	Presidency.		Eastern Frontier Brigade.		Allahabad.		Oude.		Saugor		Rohilcund.		Gwalior.		Meerut.		Sirhind.		Lahore.		Peshawur.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																						
1	Miasmatic Diseases...	659·2	7·88	219·7	1·93	631·8	11·66	405·6	6·56	1112·9	8·14	493·6	20·79	1351·4	13·26	751·5	36·81	714·4	19·75	906·1	18·73	967·5	40·83
2	Enthetic ,, ...	226·4	...	67·4	...	266·3	...	195·3	...	167·0	...	234·8	...	156·3	...	212·2	...	109·1	...	135·6	...	89·4	...
3	Dietic ,, ...	44·7	...	1·9	...	22·4	·81	38·2	·48	10·5	·58	12·7	...	42·0	·55	17·8	·25	13·7	...	15·7	...	15·0	·21
4	Parasitic ,, ...	10·1	...	15·4	...	8·9	...	9·2	...	12·2	...	8 1	...	12·7	...	8·4	...	14·4	...	7·7	...	13·1	...
	Class II.																						
1	Diathetic Diseases...	13·5	1·13	3·9	...	14·4	...	12·1	...	8·7	...	22·8	...	29 3	...	7·9	·25	7·4	...	7·3	·47	13·3	...
2	Tubercular ,, ...	19·1	75	19·3	1·93	11 7	2·14	13·6	1 22	8·7	1·75	14·1	..	6·1	...	16·5	2·54	9·4	1·67	11·7	1·41	5·6	1·25
	Class III.																						
	Diseases of the—																						
1	Nervous System	67·9	1·13	21·2	...	35·0	·31	33·1	1·46	43·6	·58	44·3	·67	39·8	3·31	34·8	1·52	23·4	1·01	39·6	·47	31·7	1·25
2	Circulatory ,, ...	10·[illegible]	·37	9·6	1·93	18·4	·92	16·8	1·22	10·5	2·33	17·4	2·01	10·5	1·11	15·7	·51	14·4	·67	19·2	1·17	5·0	1·66
3	Respiratory ,, ...	48·8	·37	36·6	...	39·6	·61	33·[illegible]	·97	61·7	1·16	59·7	·67	56·9	...	55·1	1·52	57·9	1·67	71·0	1·17	41·7	1·04
4	Digestive ,, ...	171·9	2·63	109·8	1·93	147·2	4·29	98·4	1·70	140·8	2·92	137·5	1·34	149·2	1·65	128·5	2·79	120·2	2·34	97·9	1·41	110·4	3·33
5	Urinary ,, ...	4·1	...	1·9	...	4·6	·31	3·[illegible]	...	5 2	·58	2·0	...	2·8	·55	2·0	·25	1·0	...	1·6	...	2·5	...
6	Reproductive ,, ...	24·8	...	17·3	...	18·1	...	14·[illegible]	...	23·3	...	19·5	...	12·1	...	23·3	...	17·1	...	13·1	...	11·0	...
7	Locomotive ,, ...	5·3	...	...	...	5·2	...	9·[illegible]	...	8·1	...	6 0	...	2·8	...	6·6	...	8·0	...	2·1	...	5·6	...
8	Integumentary ,, ...	105·5	...	32·8	...	141·2	...	79·7	...	114·6	·58	116·0	...	85·1	...	76·9	...	65·0	...	86·6	...	66 7	...
	Class IV.																						
4	Diseases of Nutrition	18·8	·75	11·6	1·93	25·5	...	8·5	...	18·0	...	8·1	...	17·7	...	11·7	·25	13·7	...	11·5	·23	14·2	...
	Class V.																						
1	Accidents	115·2	1·50	98·3	...	112·6	3·07	84·8	1·46	104·1	1·16	89·9	2·01	154·1	8·84	87·8	2·54	105·5	·67	118·3	5·85	107·9	2·92
3	Homicide	...	...	1·9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	...	...	...	...	...	·2	·97	...	·58	...	...	·5	1·11	...	·25	...	·34	...	...	·6	·42
6	Corporal Punishment	...	...	...	...	·6	...	·2	...	...	...	...	...	...	...	1·0	...	1·0	...	·2	...	·2	...
	Diseases not specified	4·1	...	...	...	·9	...	1·0	...	·6	...	1·3	...	3·3	...	1·0	...	·3	...	1·9	...	1·5	...
	General Total	1549·9	16·51	668·6	9·65	1504·4	23·62	1057·8	16·04	1850·5	20·36	1287·8	27·49	2132·6	30·38	1458·7	49·48	1295·9	28·12	1547·1	30·91	1502·9	52·91

Bengal. This Table shows a decrease, compared with the results for 1866, in the admissions and deaths in the Presidency, Allahabad, and Saugor Division and in the admissions in the Oude and Peshawur Divisions; in the Sirhind the admissions for the two years correspond very closely; in all the other Divisions there has been an increase in both admissions and deaths.

MIASMATIC DISEASES were more prevalent in all the Divisions, except the Presidency, Allahabad, and Saugor, in which there was a decrease, and the Oude Division in which the ratio of admissions closely corresponded with that of 1866. The following Table shows the influence of the principal diseases of this class on the sickness and mortality in each Division.

Military Divisions.	Eruptive Fevers.		Paroxysmal Fevers.		Continued Fevers.		Dysentery and Diarrhœa.		Spasmodic Cholera.		Sorethroat and Influenza.		Ophthalmia.		Rheumatism.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Presidency	1	..	720	4	156	..	508	10	9	6	74	..	62	..	190	1
Eastern Frontier	..	..	16	1	23	..	35	..	..	..	14	..	10	..	15	..
Allahabad	10	3	1,109	3	118	..	388	13	29	19	35	..	127	..	191	..
Oude	4	..	426	6	340	4	480	4	18	12	65	..	118	..	166	..
Saugor	..	..	1,472	5	17	..	184	9	..	..	26	..	44	..	137	..
Rohilcund	6	..	196	1	35	2	194	4	28	23	22	..	119	..	106	..
Gwalior	..	..	1,651	6	228	1	289	4	19	13	75	..	61	..	95	..
Meerut	5	..	1,360	13	279	6	564	18	113	108	89	..	181	..	322	..
Sirhind	..	..	1,180	6	42	..	520	4	67	49	30	..	84	..	205	..
Lahore	5	1	2,229	4	513	6	488	6	95	63	108	..	187	..	196	..
Peshawur	7	..	2,461	7	862	4	653	19	261	161	86	1	77	..	193	1
Ratio per 1,000 of Mean Strength.																
Presidency	·4	..	270·2	1·50	58·5	..	190·7	3·75	3·4	2·25	27·8	..	23·3	..	71·3	·38
Eastern Frontier	..	..	30·8	1·92	44·3	..	67·4	..	..	..	27·0	..	19·3	..	28·9	..
Allahabad	3·1	·92	340·3	·92	36·2	..	119·0	3·99	8·9	5·83	10·7	..	39·0	..	58·6	..
Oude	1·0	..	103·5	1·46	82·6	·97	116·6	·97	4·4	2·92	15·8	..	28·7	..	40·3	..
Saugor	..	..	806·3	2·91	9·9	..	107·0	5·23	..	..	15·1	..	25·6	..	79·7	..
Rohilcund	4·0	..	131·4	·67	23·5	1·34	130·1	2·68	18·8	15·43	14·8	..	79·8	..	71·1	..
Gwalior	..	..	912·1	3·32	126·0	·55	159·7	2·21	10·5	7·18	41·4	..	33·7	..	52·5	..
Meerut	1·3	..	345·3	3·30	70·8	1·52	143·2	4·57	28·7	27·42	22·6	..	45·9	..	81·7	..
Sirhind	..	..	395·0	2·01	14·1	..	174·1	1·34	22·4	16·40	10·1	..	28·1	..	68·6	..
Lahore	1·2	·23	522·0	·93	120·1	1·41	114·2	1·41	22·2	14·75	25·3	..	43·8	..	45·9	..
Peshawur	1·5	..	512·7	1·46	179·6	·83	136·0	3·96	54·4	33·54	17·9	·21	16·0	..	40·2	·21

Bengal. *Paroxysmal Fevers.*—Compared with the results for 1866 there has been a very great reduction in the admissions in the Presidency and Saugor, but a marked increase in the Meerut, Gwalior, Lahore, and Peshawur Divisions. There has been a trifling decrease in the Allahabad and Rohilcund Divisions, an increase in the Oude Division, while in the Sirhind the ratio was the same in the two years. The mortality was higher than in 1866 in the Gwalior, Meerut, Sirhind, and Peshawur Divisions, was the same as in that year in the Rohilcund Division, and was lower in all the other Divisions.

In the Presidency Division at Hazareebaugh, the A Battery 16th Brigade Royal Artillery had 66 admissions in a strength of 112, but this may have been attributable to its previous service at Jubbulpore. The 91st Regiment at the same station had only 209 cases in an average strength of 805; in the preceding year the ratio of admissions by paroxysmal fevers in it at Dum Dum had been 1,165 per 1,000. In the Allahabad Division the 107th Regiment had 558 cases and two deaths in a strength of 814, but the two Batteries of Royal Artillery, at the same station, with a strength of 206 men, had only 24 cases. It was the third year of consecutive service of the 107th at Allahabad and of one of the batteries of Artillery. In the Saugor Division, at Saugor two Batteries of Royal Artillery had 257 cases in an average strength of 201, and the 1st Battalion 7th Regiment 506 cases and three deaths among 722 men; at Jhansi the Battery of Royal Artillery had 103 admissions in an average strength of 105 men, and the 93rd Regiment at the same station, with a detachment at Sepree, 655 cases and a death out of a strength of 708. In the Meerut Division the head-quarters of the 79th Regiment at Roorkee had 332 cases and 5 deaths in an average strength of 351 men, and the wing at Delhi had 248 cases and three deaths in 299 men. In the Sirhind Division the two Batteries of Royal Artillery at Umballa had 156 admissions from an average of 277 men, the 94th Regiment at the same station had 288 cases in a strength of 638, and the 21st Hussars 135 in 418 men. In the Lahore Division, at Fort Lahore the admissions by paroxysmal fevers from the Battery of Artillery were 107 in an average strength of 62 men; at Meean-Meer the Royal Artillery 332 strong furnished 155 cases, but the 106th Regiment, with a strength of 768 men had no less than 1,133, being the highest proportion of cases in any corps in the command. The excessive prevalence of intermittent fever in this corps was attributed by the Medical Officer in charge to its previous service at Neemuch and Nusseerabad in the Bombay Presidency, where the men had become saturated with malaria. At Sealkote, in the same division, the 38th Regiment had 554 cases and 2 deaths, in a strength of 1,004, but the 7th Hussars and the Battery of Artillery there had a very small number of cases. At Fort Govindghur the Battery of Artillery had 34 cases among 69 men. In the Peshawur Division, the Royal Artillery at Peshawur and Fort Attock in an average strength of 529 men had 443 cases, and the 77th Regiment at Peshawur in 797 had 790 cases. At Nowshera the 1st Battalion 19th in an average of 852 men had 745 cases. These are the stations at which paroxysmal fevers appear to have been extremely prevalent, but at none did the mortality by them prove excessive.

Continued Fevers were very prevalent in the Gwalior, Lahore, and Peshawur Divisions, but in the last the admissions were lower than in 1866. The corps which had the largest amount of fevers of the continued type were the 77th at Peshawur, the 1st Battalion 5th Regiment at Ferozepore, and the 93rd at Jhansi. The 88th at Rawul Pindee, the 55th at Lucknow, and the 41st at Agra had also considerably above the average of admissions from this cause.

Dysentery and Diarrhœa have been lower than in 1866 in the Presidency, Allahabad, Saugor, and Meerut, but higher in all the other Divisions. The Presidency Division, however, still had the highest proportion of admissions, and next to it the Sirhind Division. In the former, both diseases prevailed to a great extent in the 27th Regiment at Dum Dum and the 91st at Hazareebaugh, and in the latter diarrhœa in the 90th at Subathoo, the 94th at Umballa and the 104th at Dugshai. These diseases were also greatly above the average in the 1st Battalion 3rd Regiment at Meerut, the 106th at Meean-Meer, and the E Battery F Brigade Royal Artillery and the 42nd and 77th Regiments at Peshawur, the B Battery 8th Brigade Royal Artillery

and 55th Regiment at Lucknow, the 36th at Shahjehanpore and Moradabad, and the 103rd at Morar. *Bengal.*

Spasmodic Cholera was more prevalent and fatal than in 1866 in all the Military Divisions, except the Presidency and Saugor, in the latter of which no case was admitted, and in the former the proportion of cases and deaths was considerably under half that of the preceding year. As already stated the prevalence and mortality of this disease closely corresponded with the results of the epidemic of 1860, but its distribution was very different. On that occasion the Gwalior, Presidency, Benares, and Meerut Divisions furnished the highest proportion, the Peshawur, Lahore, and Sirhind the lowest, while in 1867 the Peshawur, Meerut, Sirhind, Rohilcund and Lahore Divisions suffered most, and the Presidency, Oude, and Allahabad the least. The Meerut was the only Division which was seriously affected on both occasions, and the Saugor the only one which escaped.

Cholera prevailed to a great extent among the European troops in Bengal in the months of May, June, July, August, and September. The stations at which it may be considered to have assumed the form of an epidemic among them are shown in the following Table, in which is also stated the strength of the troops at the date of the outbreak:—

Military Division.	Station.	Strength at date of Outbreak.	Admissions by Cholera at Station and in Camps.	Deaths by Cholera at Station and in Camps.	Month of Outbreak.
Allahabad ..	Allahabad ..	979	28	18	July.
Rohilcund ..	Shahjehanpore	466	22	17	May.
Gwalior ..	Morar ..	1,093	19	13	May.
	Fort Gwalior				July.
Meerut	Meerut	1,649	111	106	August.
Sirhind ..	Umballah ..	1,352	27	21	April.
	Jullundur ..	891	12	9	September.
	Subathoo ..	607	28	19	April.
Lahore ..	Meeán-Meer ..	1,138	80	51	May.
	Ferozepore ..	833	12	9	June.
Peshawur ..	Peshawur ..	1,796	254	157	May.

Under each of the stations are included the cases and deaths at the cholera camps to which the troops were removed on the outbreak of the disease in the cantonments.

Cholera prevailed to a greater extent and was more fatal among the troops at Peshawur than at any other station in the Command. It broke out on the 20th of May and continued to prevail till the end of June, notwithstanding the removal of the troops into camp and the frequent changes of camping ground. Between the 20th May and the beginning of July, two batteries Royal Horse Artillery, in a strength of 253 men had 32 cases and 18 deaths; two batteries Royal Artillery, in 177 men had 29 cases and 21 deaths; the 42nd Regiment, in 683 men had 119 cases and 67 deaths; and the 77th, in 683 had 73 and 51—making a total of 254 cases and 157 deaths in 40 days, in a force of 1,796 men.

At Meerut, which next to Peshawur was the station at which the troops suffered to the greatest extent, the first case occurred in the Artillery in the middle of August, when the disease had nearly ceased among the civil population. On the 17th, the first case in the 1st Battalion 3rd Regiment occurred, and between that date and the 26th September there were 106 cases and 101 deaths in a strength of 708 men. Two fatal cases afterwards occurred in the regiment in the end of October. The regiment was moved into camp on the 19th August, and the camping ground was repeatedly changed during the prevalence of the epidemic. While this enormous mortality—the highest rate experienced by any corps in the Command—was taking place, the 19th Hussars, at the same station, had only one case and death in 374 men; two batteries

Bengal. Royal Horse Artillery, 2 cases and 2 deaths in 265 men; and three batteries Royal Artillery also two fatal cases in 302 men.

At Meean-Meer cholera broke out twice. In the end of May it appeared in the 106th Regiment, which was immediately moved into camp. Cases continued to occur in it till the middle of June, when the disease ceased, and the regiment returned into cantonments on the 20th of that month. During that period there were 13 cases and 9 deaths. On the 28th June cholera re-appeared in the corps, which was moved into camp on the 1st July; but the disease continued to prevail in the different camps till the end of July, when the regiment returned to cantonments. During this second outbreak 60 cases and 38 deaths occurred among the men. In a strength of 813 there were altogether 73 admissions and 47 deaths by this disease. The Royal Artillery at Meean-Meer, in a strength of 325 men had only 7 cases and 4 deaths.

At Allahabad, the 107th Regiment in 602 men had 25 cases and 16 deaths. At Shahjehanpore, the right wing of the 36th, in 466 had 22 and 17. At Umballah, the 94th had 22 cases and 18 deaths in 681 men, while the 21st Hussars had only 4 cases and 2 deaths in 407, and the Artillery 1 fatal case in 269 men. At Subathoo, the 90th Regiment had 28 cases and 19 deaths in 607 men.

A detailed history, by Inspector-General Dr. Beatson, of the progress of the epidemic, and of the measures adopted to check its progress, will be found at page 335 of the Army Medical Department Report for 1866.

Ophthalmia was much above the average in the Rohilcund Division, from its prevalence in the 37th Regiment at Bareilly. It first attacked the women and children, but extended to the men, among whom 75 admissions took place. The Medical Officer in charge was of opinion that the disease was in a great measure attributable to the defective construction of the married quarters.

Enthetic Diseases.—There has been a reduction in the admissions by this class of diseases in all the Divisions except Saugor and Rohilcund, where the proportion was a fraction higher than in 1866. The reduction has been greatest in the Allahabad and Oude Divisions. The ratio of admissions in the Peshawur Division was remarkably low. This was probably due to the troops being so long encamped on account of the cholera, and the suspension of intercourse, so far as possible, with the natives in the adjoining towns and villages. Notwithstanding the great reduction at Allahabad, it still gives a higher proportion of cases than any of the other military divisions.

Diseases of the Digestive System were slightly more prevalent than in 1866 in the Allahabad Division; they were in nearly the same proportion in the two years in the Gwalior, Meerut, and Sirhind, and were less prevalent in all the other Divisions. The reduction was chiefly in cases of dyspepsia and hepatic inflammation. The ratio of mortality by them was higher in the Meerut, Sirhind, and Peshawur, and lower in the other Divisions.

Diseases of the Integumentary System were more prevalent than in 1866 in the Presidency, Allahabad, Saugor, Rohilcund, and Gwalior Divisions, and less prevalent at all the others. At Delhi only 6 cases of the "Delhi ulcer" were admitted,—5 from the battery of artillery, and one from the right wing of the 79th Regiment. This satisfactory abatement of a disease which was recently a source of very considerable inefficiency, is believed to have been a result of the troops being now supplied with good water.

Accidental and Violent Deaths.—There has been a decrease in the proportion of deaths by this class, compared with the results for 1866, in all the military divisions except the Oude, Rohilcund, Gwalior, and Lahore; in the last two there was a very great increase, the proportion in each being more than double that of the preceding year. This was due to sunstroke, of which there were 188 cases and 71 deaths throughout the Command. The great excess of these, however, occurred in three regiments—the 1st Battalion 5th Regiment, at Ferozepore, had 16 cases and 6 deaths; the 106th, at Meean-Meer, 48 cases and 13 deaths; and the 103rd, at Morar and Fort Gwalior, had 46 cases and 12 deaths. This great prevalence of sunstroke was attributed by the Medical Officers in charge to the exposure of the men when moved out of cantonments to the cholera camps. In support of this opinion, it is stated that in the 103rd Regiment 37 cases and 7 deaths occurred on the 15th and 16th July, when the corps was *en route* to and in the cholera camp, and that

in the 106th Regiment 44 of the cases and 12 deaths were in the camp, and only 4 cases and 1 death in cantonments. Of the deaths, 1 occurred in April, 2 in May, 9 in June, 44 in July, 6 in August, 8 in September, and 1 in October. *Bengal.*

The following Table shows the admissions into hospital, and deaths in each corps serving in the Command during 1867 :—

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died. In India.	Died. Of Invalids.	Died. Total.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Stations during the Year.
CAVALRY.								
2nd Dragoon Guards	415	288	6	..	6	694·0	14·46	Muttra, 10½ months; on march to Mhow, ½ month.
7th „ „	193	296	6	2	8	1533·7	41·45	Benares, 8½ months; Wing at Cawnpore, 7 months; Calcutta, ½ month; embarked for England.
5th Lancers	456	424	7	1	8	929·8	17·54	Lucknow, 12 months.
7th Hussars	467	339	5	..	5	725·9	10·71	Sealkote, 12 months.
11th „	19	28	..	..	..	1473·7	..	Muttra, ½ month.
19th „	430	649	5	1	6	1509·3	13·95	Meerut, 11½ months; on the march, ⅔ month.
20th „	445	472	10	2	12	1060·7	26·97	Campbellpore, 12 months; 2 Troops at Sydun Bowlie.
21st „	418	504	8	1	9	1205·7	21·53	Umballa, 12 months.
Total Cavalry	2,843	3,000	47	7	54	1055·2	18·99	
ROYAL ARTILLERY.								
A Brigade, R. H. A.	701	997	15	2	17	1422·2	24·25	Hd.-Qrs., and A Battery, Meerut, 12 months. B Battery, Meean-Meer, 12 months. C „ Lucknow, 12 months. D „ Meerut, 12 months. E „ Umballa, 12 months.
C „ „	130	245	1	1	2	1884·6	15·38	F „ Benares, 12 months.
F „ „	778	1,523	50	..	50	1957·6	64·27	Hd.-Qrs., and A Battery, Umballa, 12 months. B Battery, Sealkote, 12 months. C „ Morar, 12 months. D „ Rawul Pindee, 12 months. E „ Peshawur, 12 months. F „ Peshawur, 12 months.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
8th Brigade, R. A.	440	654	15	1	16	1486·4	36·36	Hd.-Qrs., and B Battery, Lucknow, 12 months. C Battery, Fyzabad, 9⅔ months; on the march, 1⅓; Morar, 1 month. D ,, Seetapore, 9⅔ months; on the march, ⅓ month; Bareilly, 2 months.
11th ,, ,, ...	437	535	20	2	22	1224·3	50·34	D ,, Agra, 10⅓ months; embarked for England. E ,, Morar, 9⅓ months; on the march, ⅓ month; embarked for England. F ,, Bareilly, 9⅓ months; on the march, ⅔ month; embarked for England. G ,, Cawnpore, 10 months; embarked for England.
16th ,, ,, ...	914	1,764	18	4	22	1930·0	24·07	A ,, On the march, 2 months; Hazareebaugh, 10 months. B ,, Meerut, 12 months. C ,, Barrackpore, 12 months. D ,, Barrackpore, 12 months. E ,, Saugor, 12 months. F ,, Dinapore, 12 months. G ,, On the march, 1 month; Jubbulpore, 11 months.
19th ,, ,, ...	949	1,844	39	1	40	1416·2	42·15	A ,, Ferozepore, 10 months; on the march, 2 months. B ,, Rawul Pindee, 12 months. C ,, Meerut, 12 months. D ,, Mooltan, 12 months. E ,, Peshawur, 12 months. F ,, Meean-Meer, 12 months. G ,, Jullundur, 12 months.

Corps.	Average Strength for the year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids	Total.	Admitted.	Died.	
22nd Brigade, R.A.	581	1,108	18	2	20	1907·1	34·42	A Battery, Allahabad, 12 months. B ,, Jhansi, 9⅛ months; on the march, 2⅞ months. No. 3 Battery, Lucknow, 12 months. No. 4 ,, Peshawur, 12 months. No. 5 ,, Morar, 12 months. No. 6 ,, Meean-Meer, 1½; Fort Lahore, 10½ months. No. 7 ,, Agra, 11½ months; on the march, ½ month.
24th ,, ,, ...	400	505	4	1	5	1262·5	12·50	No. 1 Battery, Mooltan, 12 months. No. 2 ,, Meean-Meer, 12 months. No. 3 ,, Meerut, 12 months. No. 4 ,, Allahabad, 12 months. No. 5 ,, Morar, 12 months. No. 6 ,, Fort Govindghur, 12 months.
25th ,, , ...	337	664	10	..	10	1970·3	29·69	Hd.-Qrs., Allahabad, 12 months. No. 1 Battery, Saugor, 12 months. No. 2 ,, Delhi, 12 months. No. 3 ,, Calcutta, 12 months. No. 4 ,, Attock, 12 months. No. 5 ,, Darjeeling and Calcutta, 12 months.
Total Royal Artillery	5,667	9,339	190	14	204	1677·0	36·64	

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
INFANTRY.								
1st Battalion 3rd Foot..	679	1,059	134	..	134	1559·7	197·35	Meerut, 12 months.
1st ,, 5th ,, ...	708	989	19	..	19	1406·8	27·03	Hd.-Qrs. and Right Wing, on the march, 1 month; Ferozepore, 11 months. Left Wing, on the march, 2 months; Ferozepore, 10 months.
1st ,, 7th ,, ...	722	1,159	17	2	19	1605·3	26·32	Sangor, 12 months.
1st ,, 11th ,, ...	804	618	9	..	9	768·7	11·19	Fyzabad, 12 months.
2nd ,, 12th ,, H. Q.	458	357	12	4	23	779·5	28·75	Seetapore, 10 months; on the march, 1 month; Jubbulpore, 1 month.
Do. ,, ,, ,, Right Wing ..	342	290	7			847·9		Roy Bareilly, 10½ months. Joined Head-Quarters.
1st ,, 19th ,, ...	852	1,246	21	..	21	1462·5	24·65	Peshawur, 1½ months; Nowshera, 10⅔ months. Detachment at Fort Attock, 2⅔ months.
1st ,, 23rd ,, ...	829	1,373	19	3	22	1656·2	26·54	Jubbulpore, 11 months; on the march, 1 month. Detachment at Nagode.
27th Regiment	589	967	6	3	9	1641·8	13·58	On the march, ⅓ month; Dum Dum, 9⅓ months; Calcutta, 1⅓ month. Detachments at Berhampore and Barrackpore. Embarked for England.
34th ,, ...	59	74	..	..	..	1254·2	..	Morar, 1 month; on the march, 1 month. Embarked for England.
35th ,, ...	564	415	4	1	5	735·8	8·86	Mooltan, 10 months. Detachment at Dera Ismael Khan. Embarked for England.
36th ,, H. Q.	523	874	25	..	25	1671·1	47·80	Shahjehanpore, 10 months; on the march, 2 months.
Do. ,, Left Wing	257	368	8	..	8	1431·9	31·13	Moradabad, 10⅓ months. Joined Head-Quarters.
37th ,, ...	683	683	10	..	10	1000·0	14·64	Bareilly, 12 months.
38th ,, ...	1,004	1,574	15	..	15	1567·7	14·94	Sealkote, 12 months. Detachments at Subathoo, Lahore, Umritsir, and Dugshai.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
41st Regiment	851	1,141	13	..	13	1340·8	15·28	Agra, 12 months.
42nd ,, ...	624	717	87	..	87	1149·0	139·43	Peshawur, 5 months; in Cholera Camp, 4½ months; on the march, 2½ months.
46th ,, ...	864	1,000	11	1	12	1157·4	13·89	Lucknow, 11 months; on the march, 1 month.
55th ,, ...	874	1,086	15	..	15	1242·6	17·16	Lucknow, 12 months.
58th ,, H. Q.	467	285	3	1	8	610·3	10·28	Senchal, 12 months.
Do. ,, Left Wing	311	580	4			1865·0		Benares, 12 months.
2nd Battalion 60th Regiment	139	196	3	..	3	1410·1	21·58	Arrived from England. Calcutta, 2 months. Detachment at Dum Dum.
77th Regiment	797	1,880	69	1	70	2358·8	87·83	On the march, 1 month; Peshawur, 11 months; Detachment at Fort Attock, 8 months.
79th ,, H. Q.	351	824	17	..	17	2347·6	48·43	Roorkee, 12 months.
Do. ,, Right Wing	299	583	10	..	10	1949·8	33·44	Delhi, 12 months.
82nd ,, ...	778	823	31	1	32	1057·9	41·13	Meean-Meer, 2⅜ months; Jullundur, 6⅜ months; Mooltan, 1⅜ months; on the march, ⅜ month. Proceeded to Bombay.
88th ,, ...	631	618	10	2	12	979·4	19·02	Rawul Pindee, 8 months; Peshawur, 1⅜ months; on the march, 2½ months.
88th ,, Left Wing	181	56	..	..	..	309·4	..	Nuttea Gully and Kala Baugh, 5½ months.
90th ,, ...	802	1,008	31	1	32	1256·9	39·90	Nowshera, ½ month; on the march, 1½ month; Subathoo, 10 months.
91st ,, ...	805	866	9	3	12	1075·8	14·91	Dum Dum, 1 month; on the march, ¼ month; Hazareebaugh, 9⅜ months; Allahabad, 1 month.

Corps.	Average Strength during the Year.	Admitted into Hospital.	Died.			Annual Ratio per 1,000.		Stations during the year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
93rd Regiment	708	1,400	9	2	11	1977·4	15·54	On the march, $\frac{3}{4}$ month; Jhansi, 11$\frac{1}{4}$ months. Detachment at Seepree, 7$\frac{3}{4}$ months.
94th ,, ...	638	948	27	..	27	1485·9	42·32	Umballa, 9$\frac{3}{4}$ months. Proceeded to Kurrachee.
97th ,, ...	87	71	..	1	1	816·1	11·49	Ferozepore, $\frac{1}{2}$ month; Meean-Meer, 1 month. Embarked for England.
98th ,, ...	20	32	2	..	2	1599·6	100·00	On the march, $\frac{1}{2}$ month. Embarked for England.
101st ,, ...	813	1,123	20	4	24	1381·3	29·52	Cawnpore, 12 months. Detachment at Futtyghur.
103rd ,, ...	791	1,438	32	1	33	1817·9	41·72	Mhow, $\frac{1}{2}$ month; on the march, 1 month; Morar, 10$\frac{1}{2}$ months. Detachment at Fortress Gwalior.
104th ,, ...	845	806	5	1	6	953·8	7·10	Jhansi, $\frac{3}{4}$ month; Morar, 1 month; Dugshai, 8 months; on the march, 2$\frac{1}{2}$ months.
105th ,, ...	812	1,024	15	1	16	1261·1	19·70	Dinapore, 12 months.
106th ,, ...	768	1,955	70	2	72	2545·6	93·75	Arrived from Bombay. On the march, 1$\frac{3}{4}$ months; Meean-Meer, 9$\frac{1}{4}$ months.
107th ,, ...	814	1,388	39	4	43	1705·2	52·83	Allahabad, 12 months.
109th ,, ...	28	40	..	..	..	1428·6	..	Arrived from Bombay. Mooltan, $\frac{1}{4}$ month.
2nd Battalion Rifle Brigade	505	799	3	3	6	1582·2	11·88	Calcutta, 9 months. Embarked for England.
3rd ,, ,, ...	959	916	8	1	9	955·2	9·38	Rawul Pindee, 12 months. Detachment at Murree Hills, 6 months.
Total Infantry	25,630	35,649	849	43	892	1390·9	34·89	

Bengal. On comparing the amount of sickness and mortality in the different arms of the Service, it will be found to have been highest in the Artillery, and lowest in the Cavalry. On instituting a comparison between the different corps which were in the Command during the whole year, the lowest ratio of admissions will be found to have been in the 7th Hussars, at Sealkote. The ratio was still lower in the 2nd Dragoon Guards, at Muttra, but that corps left India before the end of the year. The highest ratio of admissions was in the 106th Regiment, but it arrived in the Command from Bombay in the beginning of February. Of those corps which were in Bengal during the whole year, the 77th, at Peshawur, had the highest proportion of cases. The mortality was lowest in the 104th Regiment, at Dugshai, where it was considerably under one per cent. of the strength, while it was highest in the 1st Battalion 3rd Regiment, at Meerut, where it very nearly reached 20 per cent. In the 42nd, at Peshawur, it amounted to almost 14 per cent. The 3rd Battalion Rifle Brigade, at Rawul Pindee and Murree, the 58th at Senchal and Benares, the 7th Hussars at Sealkote, and the 35th Regiment at Mooltan, had very low death rates; but the last was in the Command only during 10 months.

SANITARY REPORT.

The Report accompanying the Annual Sanitary Return from the Bengal Command, in 1867, prepared by Staff Assistant-Surgeon Sutherland, after tabulating the vital statistics of the troops for that year, remarks:—

The increase in the mortality during the year has been due to the epidemic of cholera, as, had there been no occurrence of such, the mortality of 1867 would have contrasted very favourably with that of the previous year.*

Regarding the meteorologicol condition of the year, suffice it to state that the months of January, February, and March were pleasant; that in the early part of April the days became hotter, although in certain stations a depression of temperature was observed, and notably at Roorkee and Hurdwar on the 12th April. The hot winds lasted the usual time, and were followed by the rains, which may be stated to have come on at the normal time, "but their "disappearance was not so uniform as in the eastern and southern districts of "the North-West Provinces; the rains continued with many considerable "breaks well into October."†

The subjoined Table exhibits the admissions and deaths from insolatio and apoplexia during the years 1866 and 1867:—

Years.	Admissions from Insolatio and Apoplexy.	Deaths from Insolatio and Apoplexy.	Ratio per 1,000 of Strength to Deaths from Insolatio and Apoplexy.‡
1866	123	61	1·72
1867	214	86	2·51

The above Table shows that the mortality from insolatio and apoplexy in 1867 was much greater than that of the previous year. The greatest mortality occurred in the 103rd and 106th Regiments, when they were in camp, on account of the cholera epidemic.

The admissions and deaths from variola have been slightly in excess of

* The remarks on cholera have been omitted, as that subject was so fully discussed in the various Reports contained in the departmental volume for 1866, published last year.

† Extracted from the published Meteorological Observations of 1867.

‡ In the above comparative statement, one admission has been added for every death occurring out of hospital in 1867, these were 13 in number.

The same remark applies to the deaths out of hospital in 1866 (9 in number).

those of the previous year. In 1866 there were 20 admissions into hospital, and 3 deaths, whereas in 1867 there were 27 admissions and 4 deaths. *Bengal.*

The establishment of lock hospitals in military cantonments, and the enforcement of police regulations, must be viewed as very important measures, and will no doubt tend to lessen and repress the many evils consequent on prostitution. That such will be the case there cannot be a doubt, as wherever the sanitary measures above noted have been adopted and rigidly carried out, the results have been highly satisfactory. These first instalments of an important measure will no doubt be ultimately extended, as it is well known that, at present, in certain stations, native women, under no supervision, living some distance from cantonments, and supposed to be employed in field labour, prostitute their bodies at a cheap rate, and disease is of course the natural consequence.

Syphilis is unquestionably one of the most powerful causes of physical degeneration, whether it be viewed by its effects on the individual contracting the disease, or by its frequently "transmitted evils to wives and children."

The authorities, being fully sensible of the great importance of ample accommodation and good ventilation being afforded to the men in barracks, have had during the year not only many defects remedied, but at certain stations buildings have been erected, some of which are in such a stage of completion as to be almost ready for occupation.

The defects in the construction, ventilation, and position of certain barracks pointed out by Medical Officers in their reports, are so numerous as to give one the idea that sanitary science must have been held in little estimation when the barracks referred to were built.

If for the safety of the country it is necessary that troops be located at certain stations known to be unhealthy, it is of paramount importance that the barracks be so constructed as to give the soldier the full benefit of the latest and most approved principles of sanitary science, and this undoubtedly is the end the Government authorities have now in view.

On an examination of the several regimental sanitary reports, it will be at once seen that the troops have been favourably placed as far as cubic space in barracks (and hospital) is concerned.

The smallest amount of cubic space recorded in the Plains was at Attock (4th Battery, 25th Brigade, Royal Artillery), 770 cubic feet.

At Hill Stations the lowest allowance of cubic space was at Senchall (58th Regiment), 672 cubic feet; and at Darjeeling (5th Battery 25th Brigade Royal Artillery), 877 cubic feet.

Although steps have been already taken to remedy defects when pointed out, either by improvements effected in the cells in use, or in erecting others in their stead, it is, however, clear, judging from the remarks contained in several of the reports, that numerous defects still exist. It is necessary that the soldier, while undergoing punishment, be placed in as good a sanitary condition as possible, so as to prevent his health becoming affected.

The ration of the soldier may be considered as sufficiently varied and nutritive. At certain stations, and at certain seasons of the year (particularly in the Punjaub) there is often a deficiency of vegetables, and especially of the well-known antiscorbutic, the potato.

Under these circumstances, it would be a wise measure to have compressed vegetables, preserved potatoes, or limejuice, issued to the troops during the period of scarcity of fresh vegetables.

At Mooltan, during the hot weather, there was issued daily to each man of the 35th Regiment, 1 oz. of pickles and 1 oz. of limejuice.

At Landour, from the 25th May until the 24th July, an extra pound of fresh vegetables was issued to the men in consequence of the prevalence of a scorbutic taint, chiefly among the convalescents of the 79th Regiment.

As in former years, although less frequently, the meat intended for issue to the troops has had to be condemned on account of the presence of the cysticerci of the tænia medio-canellata amongst its fibres. Such was the case at Sealkote (7th Hussars), and at Mooltan (D Battery, 19th Brigade, Royal Artillery).

The duties of the men have been the ordinary drills, guards, parades, gunnery, and rifle practice, and (as a rule) each has been conducive to health. In

Bengal. some instances, however, Medical Officers state in their reports that, owing to the arduous duties in which the men were engaged, their health became affected.

The number of nights in bed was at one time as low as two; the average however, was eight.

A fact of importance, and worthy of being recorded as illustrating the effects of too-early rising on the line of march, occurred in the 79th Regiment. The Medical Officer states, in his report, as explanatory of the great prevalence of fever in the regiment, that the long-continued marching in the months of November and December 1866, and the "too-early rising," so exhausted the men that they were well prepared to become affected by miasmatic influences.

In the 93rd (Sutherland) Highlanders (Jhansi), from the 5th November to the 8th December, afternoon drill was discontinued, and the annual course of musketry, from 11th November to the 5th December, on account of the weak and anæmic state of the men, and the great prevalence of intermittent fever.

There has been no change in the clothing during the year, and the several Medical Officers in their reports state that it has been suitable and sufficient. Several officers in medical charge of batteries of Artillery strongly recommend the introduction of serge clothing, similar to that worn by the Infantry soldier during the rainy season. The adoption of such would certainly be highly beneficial, and would tend to promote the health and comfort of the men.

The Medical Officers fully recognize the importance of the "dry earth system of conservancy," and are agreed as to its being an excellent sanitary measure.

As a rule, Medical Officers report favourably of the existing arrangements for the comforts and welfare of the sick.

II. Madras.

STATISTICAL REPORT.

Madras.

The average strength of the European troops in the Madras Command during the year was 10,793 men; there were among them 14,963 admissions into hospital, and 231 deaths, of which 24 occurred among the invalids sent to England. These numbers give the ratios of 1,386 admissions, and 21·40 deaths per 1,000 of mean strength, both considerably lower than in 1866, and slightly under the average of the last seven years.

The following Table, framed from Abstract No. 27 in Appendix, shows the admissions and deaths by each class of diseases:—

Orders.	Diseases.	Strength, 10,793.				Ratio per 1,000 of Mean Strength.			
			Deaths.			1867.		1860–66.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	5,995	59	3	62	555·4	5·75	553·0	9·25
2	Enthetic „ ..	2,401	1	2	3	222·5	·28	256·1	·37
3	Dietic „ ..	453	3	..	3	42·0	·28	18·8	·15
4	Parasitic „ ..	158	..	..	..	14·6	..	12·3	..
	Class II.								
1	Diathetic Diseases ..	90	..	1	1	8·3	·09	6·3	·24
2	Tubercular „ ..	178	26	9	35	16·5	3·24	16·9	2·10
	Class III. Diseases of the—								
1	Nervous System ..	347	28	2	25	32·2	2·32	37·1	1·44
2	Circulatory „ ..	197	15	3	18	18·3	1·66	17·0	1·26
3	Respiratory „ ..	490	6	1	7	45·4	·65	53·6	·63
4	Digestive „ ..	1,788	46	2	48	165·7	4·45	146·1	3·89
5	Urinary „ ..	49	1	..	1	4·5	·09	3·0	·18
6	Reproductive „ ..	227	..	..	..	21·0	..	16·8	..
7	Locomotive „ ..	34	1	..	1	3·1	·09	5·1	·02
8	Integumentary „ ..	1,126	..	..	..	104·3	..	127·6	·09
	Class IV.								
4	Diseases of Nutrition..	252	..	..	..	23·3	..	8·9	·19
	Class V.								
1	Accidents	1,162	18	1	19	107·7	1·76	111·0	1·86
4	Suicide	1	8	..	8	·1	·74	..	·25
6	Corporal punishment..	5	..	..	..	·5	..	2·6	..
	No appreciable Disease	10	..	..	..	·9	..	·5	..
	Diseases not specified..	..	..	..	..	..	..	3·5	·17
	Total	14,963	207	24	231	1386·3	21·40	1396·2	22·09

Compared with the results for 1866, there has been a considerable reduction in miasmatic diseases, and also, though not to so great an extent in enthetic diseases and those of the integumentary system.

Madras. Miasmatic Diseases furnished almost exactly the average proportion of admissions, but the deaths were nearly two-fifths under the average. The following Table shows the admissions and deaths by the principal diseases in this class.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1867. Admitted.	1867. Died.	1860–66. Admitted.	1860–66. Died.
Eruptive Fevers..	14	1	1·3	·09	·8	·08
Paroxysmal „	2,113	2	195·8	·18	163·0	·76
Continued „	799	10	74·0	·93	78·8	1·27
Dysentery and Diarrhœa	1,923	41	178·1	3·80	174·0	2·98
Spasmodic Cholera..	10	3	·9	·28	6·2	3·08
Sorethroat and Influenza	181	..	16·8	..	16·7	..
Ophthalmia..	272	..	25·2	..	35·6	..
Rheumatism.	532	1	49·3	·09	63·2	·04

There has been an increase in the admissions by paroxysmal fevers, but this has been counterbalanced by a reduction in other diseases, and especially in ophthalmia and rheumatism.

Spasmodic Cholera did not prevail as an epidemic among the European troops during the year.

Enthetic Diseases have been less prevalent than in 1866. The reduction has taken place in the syphilitic group.

Dietic Diseases have occasioned more than double the average number of admissions, and, with the exception of scurvy, they were all cases of intemperance (*ebriositas*). The increase was attributed to the distribution of the Kirwee prize money, in September, and to the amount of money received by the men as bounty on re-engagement.

Diseases of the Circulatory System show a very marked decrease upon the results for 1866. This has been chiefly in cases of inflammation of the heart (*carditis*), which amounted to only half the number of the preceding year. Under this head 62 cases are returned without a single death. We cannot but express the same doubt as with reference to the Returns of 1866, "that cases of functional derangement of the heart's action have been "erroneously returned as inflammation." Of the 62 cases 25 were in the 18th Hussars and 30 in the 108th Regiment.

Diseases of the Respiratory System show a reduction in cases of bronchitis, and those of the Integumentary System in cases of boils (*phlegmon*) and ulcers. Diseases of the Digestive System, though above the average of the last seven years, were less prevalent than in 1866. Inflammation of the liver continues the most prominent disease in this class, and was the only one which occasioned any mortality, with the exception of inflammation of the bowels of which one case terminated fatally.

The admissions and deaths at each station in the Command are shown in the following Table:—

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.	
					Admitted.	Died.
Sea Coast ..	Fort St. George and St. Thomas's Mount	1,172	1,955	24	1,668·1	20·48
	Cannanore	647	676	6	1,044·8	9·27
	Calicut	86	81	2	941·9	23·26
	Palaveram	52	37	1	711·5	19·23
Plains ..	Trichinopoly	212	305	1	1,438·7	4·72
	Malleapooram	85	77	..	905·9	..
Table Lands .	Bangalore	1,745	1,312	20	751·9	11·46
	Bellary	793	989	6	1,247·2	7·57
	Secunderabad	2,398	3,674	83	1,532·1	34·61
	Kamptee	1,060	1,969	9	1,857·5	8·49
	Seetabuldee	48	128	..	2,666·7	..
Hill Station .	Wellington	372	348	5	935·5	13·44
Birmah ..	Rangoon	680	1,110	7	1,632·4	10·29
	Tonghoo	398	484	11	1,216·1	27·64
	Thayetmyo	533	647	7	1,213·9	13·13
	Port Blair	109	252	1	2,311·9	9·17
Singapore ..	Singapore	107	168	2	1,570·1	18·69
	Penang	39	74	..	1,897·4	..
Depôts ..	Poonamallee	181	405	10	2,237·6	55·25
	Chindwarrah	134	103	..	3,029·4	..
	Ramandroog	40	166	2	4,150·0	50·00
Troops on the March and detached ..		..	..	10	..	..

Omitting the Depôts and Seetabuldee, where the force has been very small, the admissions have been highest at Port Blair, and the deaths, as in the preceding year, at Secunderabad.

The admissions and deaths at each group of stations by the different classes of diseases are shown in the following Table :—

Madras.

Order.	Diseases.	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Depôts.		Stations on Sea Coast.		Stations on Plains.		Stations on Table Land.		Hill Station.		Birmah.		Singapore.		Depôts.	
	Average Strength ...	1,967		298		6,044		372		1,722		146		255		Annual Ratio per 1,000 of Strength.													
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																												
1	Miasmatic Diseases ...	931	9	110	...	3560	36	112	1	942	6	40	...	290	3	475·7	4·60	369·1	...	589·0	5·06	301·1	2·69	547·0	3·48	373·9	...	1137·2	11·77
2	Enthetic ,, ...	608	...	103	...	1171	1	50	...	405	...	22	...	77	...	310·7	...	345·6	...	193·9	·16	134·4	...	235·2	...	150·7	...	302·0	...
3	Dietic ,, ...	94	1	9	...	286	2	2	...	29	...	20	...	13	...	48·0	·51	30·2	...	47·3	·33	5·4	...	16·8	...	137·0	...	51·0	...
4	Parasitic ,, ...	33	...	5	...	103	...	3	...	11	...	...	...	3	...	16·9	...	16·8	...	17·0	...	8·1	...	6·4	...	...	...	11·8	...
	Class II.																												
1	Diathetic Diseases ...	10	...	1	...	49	...	...	...	20	...	...	...	6	...	5·1	...	3·4	...	8·1	...	...	...	11·6	...	...	...	23·5	...
2	Tubercular ,, ...	27	5	1	...	89	10	16	1	18	5	4	1	25	3	13·8	2·56	3·4	...	14·7	1·66	43·0	2·69	10·5	2·90	27·4	6·85	98·0	11·77
	Class III.																												
	Diseases of the—																												
1	Nervous System ...	60	6	17	...	165	13	11	1	49	1	14	...	28	1	30·7	3·06	57·0	...	27·3	2·15	29·6	2·69	28·5	·58	95·9	...	109·3	3·92
2	Circulatory ,, ...	42	3	2	1	96	6	5	1	23	1	1	1	30	2	21·5	1·53	6·7	3·35	15·9	·99	13·4	2·69	13·1	·98	6·8	6·85	117·7	7·84
3	Respiratory ,, ...	104	...	7	...	227	2	17	...	99	1	8	...	31	1	53·1	...	23·5	...	37·6	·33	45·7	...	57·5	...	51·3	...	121·6	3·92
4	Digestive ,, ...	284	5	58	...	954	32	66	...	309	6	22	...	92	1	145·1	2·56	104·6	...	157·8	5·29	177·4	...	176·3	4·07	156·7	...	350·8	3·92
5	Urinary ,, ...	11	...	2	...	17	...	11	1	5	...	4	...	7	...	5·6	...	6·7	...	2·8	...	29·6	2·69	2·9	...	27·4	...	27·4	...
6	Reproductive ,, ...	54	...	5	...	117	...	2	...	32	...	7	...	7	...	27·6	...	16·8	...	19·4	...	5·4	...	13·6	...	47·9	...	27·4	...
7	Locomotive ,, ...	9	...	1	...	18	1	3	...	3	...	...	...	3	...	4·6	...	3·4	...	3·0	·16	8·1	...	1·7	...	...	...	11·8	...
8	Integumentary ,, ...	241	...	23	...	471	...	24	...	257	...	60	...	16	...	123·2	...	77·2	...	77·9	...	61·5	...	149·2	...	411·0	...	62·7	...
	Class IV.																												
4	Diseases of Nutrition ...	21	...	...	...	109	...	13	...	78	...	10	...	21	...	10·7	...	...	...	18·0	...	34·9	...	45·3	...	68·5	...	82·4	...
	Class V.																												
1	Accidents	247	3	38	...	630	10	13	...	211	4	30	...	25	1	110·9	1·53	127·5	...	104·2	1·66	34·9	...	122·5	2·32	206·5	...	98·0	3·92
3	Homicide	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	...	1	...	...	5	...	...	...	2	...	...	...	...	...	·51	...	...	...	·33	...	...	...	1·16	...	...	...	...
6	Corporal Punishment ...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	·8	...	...	...	...	...	...	...	...
	No appreciable disease ...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	·2	...	...	...	...	...	...	...	...
	Diseases not specified ...	3	...	...	...	4	...	...	...	2	...	...	...	...	...	1·5	...	...	...	·7	...	...	...	1·2	...	...	...	...	...
	Total	2749	33	382	1	8072	118	348	5	2498	26	242	2	674	12	1404·7	16·86	1291·9	3·35	1335·5	19·62	935·6	13·45	1447·7	15·00	1657·5	13·70	2043·1	47·06

There has been a reduction in the proportion of admissions into hospital at all the groups of stations, except those on the Plains, Singapore, and the Depôts, and a reduction in the ratio of mortality at all, compared with the results of 1866. *Madras.*

MIASMATIC DISEASES have been less prevalent than in 1866 at all the groups except the Depôts, and the mortality by them has been lower at all. When sub-divided, the following results are obtained :—

Madras.

Diseases.	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Poonamallee, Ramandroog, and Chindwarrah.		Ratio per 1,000 of Strength.											
															Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Station.		Birmah.		Singapore.		Poonamallee, Ramandroog, and Chindwarrah.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fever	2	...	...	...	10	...	...	...	...	...	...	...	2	1	1·0	...	...	...	1·6	...	...	...	...	...	...	...	7·8	3·92
Paroxysmal ,, ...	160	...	38	...	1411	1	31	...	317	2	12	...	144	...	81·8	...	127·5	...	233·5	·17	83·3	...	184·1	1·16	82·2	...	564·7	...
Continued ,, ...	205	2	1	...	205	5	7	1	268	2	5	...	8	...	104·7	1·02	3·3	...	50·5	·83	18·8	2·66	155·6	1·16	34·2	...	31·4	...
Dysentery and Diarrhœa ...	319	7	38	...	1233	26	87	...	198	1	8	...	90	2	163·0	3·58	127·5	...	204·0	4·30	99·5	...	116·0	·58	54·8	...	352·9	7·84
Spasmodic Cholera	2	...	...	...	6	3	...	...	2	...	...	...	...	...	1·0	...	...	...	1·0	·49	...	...	1·2	...	...	...	...	...
Sorethroat and Influenza ...	29	...	5	...	96	...	8	...	34	...	6	...	3	...	14·8	...	16·8	...	15·9	...	21·5	...	19·7	...	41·1	...	11·8	...
Ophthalmia	36	...	8	...	192	...	12	...	14	...	2	...	7	...	18·4	...	26·8	...	31·8	...	32·3	...	8·1	...	13·7	...	27·4	...
Rheumatism	134	...	15	...	247	1	16	...	86	...	1	...	22	...	68·5	...	50·3	...	40·9	·17	43·0	...	49·9	...	6·3	...	125·5	...

Paroxysmal Fevers furnished a higher ratio of admissions than in 1866 at the stations on the Sea Coast, from the prevalence of intermittent fever in the 1st Regiment at Cannanore, probably the result of its previous service at Kamptee, but they were considerably under the average of the Command. They were also more prevalent than in 1866, and above the average of the Command at the stations on the Table Lands, but particularly at Kamptee, where the admissions by intermittent fever during the year amounted to 846 in a strength of 1,060 men, or 798 per 1,000 of the strength. The detachment at Seetabuldee also, in an average strength of 48 men, had 53 admissions by the same disease. At Secunderabad the ratio of admissions was 135 per 1,000. *Madras.*

There has been an increase in the proportion of cases of paroxysmal fevers in Birmah. They were most prevalent at Tonghoo, and in the detachment at Port Blair in the Andaman Islands. At the former station the admissions by intermittent fever were 261 per 1,000 of the strength, and at the latter 404 per 1,000. The ratio has been very high also at the Depôts, but this has been due to an epidemic of intermittent fever at Ramandroog in April, May, and June. In these three months there were 84 admissions in a strength of 74 men. A similar epidemic is stated to have prevailed at that station in 1862.

Continued Fevers were less prevalent than in 1866 at all the groups of stations, except the station on the Hills and Singapore. The proportion of admissions at those on the Sea Coast, however, was high, but this was entirely due to the 3rd Battalion 60th Regiment, at Fort St. George, in which 142 admissions by this form were recorded, and none by paroxysmal fevers. The ratio of admissions was also high in Birmah, chiefly from their prevalence at Rangoon in the latter half of the year, and at Thayetmyo in the month of June.

Dysentery and Diarrhœa show a reduction at all the groups of stations, except the Depôts, where the ratio has been high and in excess of 1866, chiefly from the occurrence of dysentery at Poonamallee. The admissions by dysentery in the 21st Regiment at Secunderabad were numerous, amounting to 351 per thousand of the strength, and 13 deaths occurred by it in that corps.

Spasmodic Cholera did not appear as an epidemic at any of the military stations. One death by it occurred at Bellary, and two at Secunderabad.

Ophthalmia has undergone a most satisfactory reduction at all the groups of stations. In the 76th Regiment, which suffered so much from it in 1866 at Bellary, there were only 57 admissions during the year at the same station.

Enthetic Diseases were less prevalent than in 1866, except at the stations on the Plains and in Birmah, at the former of which there was a very marked increase; the stations at which the proportion of cases was highest in that group were Bellary and Kamptee.

Dietic Diseases were very greatly in excess of the amount in 1866 at all the groups except the Hill Station and Birmah, at the former of which there was a slight decrease, and at the latter an increase, though the ratio still remained below the average of the Command. The increase was confined to cases admitted under the head of intemperance (*ebriositas*), and occurred chiefly in the last quarter of the year. It was due to the large amount of money received by the men as bounty on re-engagement, as prize money, as compensation for clothing and bedding not issued, and as arrears of the increase of pay granted to the Army from the 1st of April, 1867. There is too much reason to believe that this money was, except in a few instances, squandered in dissipation and debauchery. The two corps which furnished the largest number of cases of this class were the 2nd Battalion 21st, and the 3rd Battalion 60th Regiment. The Surgeon of the latter corps says: "A sum "of money, amounting to upwards of 2,000*l.*, was circulated, over a very short "space of time, amongst the men of the battalion, and a great increase of "drunkenness and military crime resulted. . . Unfortunately there were "no means of preventing the issue of this money, for so long as a man's kit is "complete, no legal reason can be assigned for withholding the sums to which "he may be entitled under any of the above heads. Very few soldiers have, "or choose to exercise, the moral courage to resist temptation, and although "they were entreated by their officers to place the money in the savings bank, "only a very small proportion followed the advice."

Madras. DISEASES OF THE DIGESTIVE SYSTEM were more prevalent than in 1866 at the stations on the Plains and Table Lands, in Singapore, and at the Depôts. Inflammation of the liver was the most prevalent and fatal disease of the class, and dyspepsia also furnished a large proportion of the admissions.

ACCIDENTAL AND VIOLENT DEATHS.—There were only 8 deaths from sunstroke recorded during the year. Of these 2 occurred at St. Thomas' Mount, 2 at Secunderabad, 2 at Kamptee, 1 at Thayetmyo, and 1 at Tonghoo. One man was killed by lightning in his barrack-room at Ramandroog, and three men were admitted into hospital at the same station on account of lightning stroke, but no particulars of these cases have been given by the Medical Officer in charge. There were 8 deaths by suicide—3 at Secunderabad, and 1 at Kamptee, Bangalore, St. Thomas's Mount, Tonghoo, and Thayetmyo respectively.

The following Table shows the admissions and deaths in each corps serving in the Command :—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Madras.	Of Invalids.	Total.	Admitted.	Died.	
Cavalry.								
16th Lancers	518	334	9	..	9	644·8	17·37	Bangalore, 12 months.
18th Hussars	439	824	12	3	15	1,877·0	34·17	Secunderabad, 12 months.
Total Cavalry	957	1,158	21	3	24	1,210·0	25·08	
Royal Artillery.								
D Brigade R.H.A.	517	851	10	1	11	1,646·0	21·28	Hd.-Qrs. and A Battery, Bangalore, 12 months. B Battery, Secunderabad, ½ month; on the march, 1 month; Bellary, 10½ months. C „ Kamptee, 12 months. D „ On the march, ½ month; Secunderabad, 11½ months.
5th Brigade R.A.	168	302	4	..	4	1,797·6	29·29	No. 1 Battery, arrived from England. Madras, 1½ month; Singapore, ½ month; Penang, 3 months; Rangoon, 6 months. No. 3 „ arrived from England. St. homas' Mount, 11¾ months.
14th „ „	397	535	7	1	8	1,347·6	20·15	A Battery, Bangalore, 12 months. B „ Trimulgherry, 12 months. C „ Kamptee, 12 months.
20th „ „	700	1,053	12	..	12	1,504·3	17·14	Hd.-Qrs. and F Battery, Kamptee, 12 months. A Battery, Rangoon, 4½ months; Fort St. George, 7½ months. B „ St. Thomas' Mount, 12 months. C „ Thayetmyo, 12 months. D „ Cannanore, 12 months. E „ Secunderabad, 12 months.

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Madras.	Of Invalids.	Total.	Admitted.	Died.	
23rd Brigade R. A.	772	987	11	1	12	1,278·5	15·54	A Battery, Bangalore, 12 months. B&G „ St. Thomas' Mount, 12 months. C „ Trichinopoly, 12 months. D „ Secunderabad, 12 months. E „ Penang, 3 months; Rangoon, 9 months. F „ Tonghoo, 12 months.
Total, Royal Artillery ..	2,554	3,728	44	3	47	1,459·7	18·40	
INFANTRY.								
1st Battalion, 1st Foot	783	827	6	3	9	1,056·2	11·49	Kamptee, 1 month; Cannanore, 11 months; Detachment at Trichinopoly, 11 months.
2nd „ 10th „	929	574	8	1	9	617·9	9·69	Bangalore, 12 months.
2nd „ 19th „ Hd.-Qrs. ..	469	610	7	..	7	1,300·7	14·92	Thayetmyo, 12 months.
Do. „ Do. „ Right Wing	332	407	11	..	11	1,225·9	33·13	Tonghoo, 12 months.
2nd „ 21st „	801	1,398	42	4	46	1,745·3	57·43	Secunderabad, 12 months.
2nd „ 24th „	757	1,317	9	1	10	1,733·8	13·21	Rangoon, 12 months. Detachment at Port Blair, Andaman Isles.
3rd „ 60th „	706	1,170	14	2	16	1,657·2	22·66	Fort St. George, 12 months.
76th Foot	771	1,107	11	2	13	1,435·8	16·86	Bellary, 12 months.
102nd „	838	1,496	8	3	11	1,785·2	13·13	Cannanore, 1 month; Detachments at Malleopooram and Calicut. Kamptee, 11 months; Detachments at Nagpore and Chindwarrah.
108th „	752	933	25	1	26	1,240·7	34·57	Secunderabad, 10 months; Proceeded to Bombay.
Total Infantry	7,138	9,839	141	17	158	1,378·4	22·13	

The ratio of admissions has been lowest in the Cavalry, and highest in the Artillery, while the reverse has been the case with regard to the mortality. The two Cavalry regiments present a striking contrast, the admissions in the 18th Hussars having been nearly treble, and the deaths nearly double the proportion in the 16th Lancers—a result of the stations occupied by these corps during the year. Among the Infantry the highest ratio of admissions occurred in the 102nd Regiment at Kamptee, and next to it in the 21st Regiment at Secunderabad, and the highest ratio of mortality occurred in the latter regiment. So high a ratio as 57 per 1,000, without any epidemic to account for it, may be deemed quite exceptional. The diseases to which it was chiefly attributable were dysentery and inflammation of the liver, the former having been the cause of 13, and the latter of 14 deaths. The 2nd Battalion 10th Regiment had the lowest ratio both of admissions and deaths. It occupied the station of Bangalore for the whole year. *Madras.*

SANITARY REPORT.

Inspector-General Hadaway, in his Report on the causes of sickness and mortality among the troops in the Madras Presidency, arranges his remarks under the following sections :—

The chief peculiarity of the climate during the past year at the various stations throughout the Command, but especially within the Presidency circle, has been a considerable deficiency in the fall of rain, which has everywhere been below the average. At the Madras Observatory only 28·83 inches were registered during the year, and in consequence of the failure of the N.E. monsoon in October and November, the notorious Coom river, which serves as cesspool for a great part of the unsavoury capital of the Presidency, failed to burst the band which blocks up what should be its embouchure into the sea, and missed its annual clearing. Probably from the deficiency of rain, the temperature was somewhat higher than usual, the average for the year having been nearly three degrees in excess of the ascertained average for a series of years. Whether in consequence of, or in spite of these meteorological peculiarities, there has been throughout the year a singular immunity from epidemic disease of every kind, and more particularly from cholera, except a few sporadic cases in January at Madras and Poonamallee, and in a detachment of volunteers from the 3rd Battalion 60th Rifles on board the steamship "Burmah," from Calcutta in September. The disease made its appearance in the latter case when the steamer was off Coconada, and 4 cases occurred on board, two of them fatal. To prevent the spread of the disease, the vessel was ordered to Ennore, where the troops were landed. One fatal case occurred after disembarkation, but the men generally were in excellent health. *Climate.* *Epidemics.*

Even from the City of Madras, in which it has long been believed to be endemic and firmly established, the disease has been almost entirely absent, and it may be hoped that this unusual exemption has not been due solely to fortuitous circumstances, but is in part attributable to the judicious sanitary measures now adopted at all the great native festivals, where, amidst the vast concourse of poverty-stricken devotees from every distance and from every point of the compass, the disease may be said to have been in former times almost "forced," and whence its seeds used to be scattered in every direction by the infected streams of returning pilgrims.

Presidency Circle.—There are not many complaints as to the barracks, but much cannot be said in favour of any of those in the circle, except those for the detachment of Infantry at Trichinopoly and those of the Convalescent Depôt at Wellington, both of which are well-planned and well constructed, efficiently ventilated, and in all respects adapted for the purposes for which they are intended. At the Invalid Depôt at Poonamallee, the barracks are as bad as they well could be ; but as the station is about to be abandoned, and a marine sanatorium at Ennore substituted for it, it is unnecessary to refer further to their faults and deficiencies. *Barracks.*

Lime-washing has been carried out in all the barracks in the Circle. At

Madras. Poonamallee it was only done once, and the Depôt Surgeon reports that he experienced considerable difficulty in getting that accomplished.

Mysore Circle.—The Regimental Reports do not contain many complaints of injury to health from defects in the barracks occupied by the men, although several are of old-fashioned construction, and necessarily imperfectly ventilated, as, for instance, those for the Infantry Regiment at Cannanore, which are built in the form of a square, and those for the Foot Artillery at Bangalore, which in addition to faults of construction are close to a crowded and offensive graveyard. Minor defects, such as leaky roofs, badly jointed floors, imperfectly fitted and imperfectly drained lavatories, are however mentioned by several officers. Surgeon-Major Macbeth, 16th Lancers, however, finds great fault with the barracks occupied by that corps, in almost every respect, as will be seen on reference to his report. I fully agree with him as to the injurious interference with the ventilation of the men's rooms by the row of family quarters on the south-west side, and also as to the desirability of having all the joints of the stone floors made water-tight; but I cannot see that any serious sanitary evils are likely to result from the erection of one additional block parallel to the eight formerly existing, and of two others at the opposite side of the square. The latter are so distant that they can scarcely interfere at all with the perflation of the old blocks, and if they did shut out a little of the north-east wind passing as it does over the bazaar, of the proximity of which Dr. Macbeth complains, I am not sure that it would be much to be regretted. The length of the rooms is of course objectionable, but a serious objection to their subdivision as recommended by the Sanitary Commission is that the prevailing winds are in the direction of their length. It may be worth while, however, to try the experiment on one or two blocks, I do not agree with Dr. Macbeth that the height and narrowness of the rooms are open to serious sanitary objections, so long as the allotment of floor space per man is ample. It is desirable that the casement ventilators should be fitted with frames with perforated zinc plates instead of moveable boards which the men can shut, but that I understand has already been ordered. The numerous doors and windows, and the open ridge ventilators extending along the whole length of each roof, and completely out of the men's reach, ensure tolerably free ventilation of the rooms so far as that can be done by any arrangement of ventilators.

Dr. Macbeth reports very strongly on the former unhealthiness of the block of barracks occupied by the D Troop of his Regiment, and on the great improvement which followed the sanitary measures adopted on his suggestion. These improvements consisted of scraping and limewashing the walls, raising the floor, removing a layer of earth from beneath it, and replacing it by a layer of fresh earth, over which the granite blocks were relaid, and removing a layer of earth several feet in breadth all round the outside of the walls. These measures were highly judicious, and no doubt part of the improvement was due to them; but it is impossible to attribute the whole, or even the greater part of it to them, as the statistics of the corps show that during the period in question, the improvement in the health of the remainder of it was very nearly equal to that of the D Troop. A memorandum containing full information on the subject was sometime ago submitted to the Officer Commanding the Mysore Division, by the Deputy Inspector-General of the Circle.

Hyderabad Circle.—It would be impossible to convey anything new in giving a detailed description of the widely-known Cantonment of Secunderabad. It may therefore suffice to glance briefly at the improvements which have been made during the past year, and which are still going on from time to time in the barracks and subsidiary buildings at present occupied by the 18th Hussars. There is still room for progress, and it may be observed that each little reformation tends more and more to confirm the belief that the former too-notorious insalubrity of these barracks, was more due to want of sanitary management than to the undoubtedly very objectionable locality.

During the year 1858 the "Royals," averaging 1,098, had 2,497 admissions into hospital, and of that number 104 died, being nearly *ten* per cent. of strength! During the year 1867, the 18th Hussars, averaging 388, having 8 blocks of the same barrack accommodation assigned to them, had 745 admissions into hospital, and of that number 7 died, being under *two* per cent. of strength.

Burmah Circle.—Viewing the barrack accommodation generally, I find that as regards space and kind, it is pretty uniform. It consists of bungalows of teak wood, raised from the ground from 5 to 10 feet. In no instance has the soldier less than 1,317 of cubic space, and in most instances no less than 2,014 cubic feet are allotted to him. *Madras.*

Through the kindness of the Chief Engineer, these barracks have been this year furnished with wooden ceilings and with roof outlet ventilation, contributing much to the lowering of the temperature, and to securing a better supply of fresh air.

The raising of the houses above the ground is the more necessary in this climate in consequence of the excessive rainfall—this year amounting to 130 inches, and of the damp and miasma which it engenders. Indeed, I am persuaded that to this cause is due the great prevalence of miasmatic diseases among the troops stationed in what are termed "temporary" barracks, though now still in use, yet erected in 1858.

Presidency Circle.—The lavatory accommodation is almost everywhere in the circle defective and inconvenient; Wellington and Trichinopoly being the only stations at which it is otherwise. *Lavatories.*

Bathing accommodation is now ample everywhere. A fine plunge bath, with a constant flow of water into it, has been added during the year to the numerous detached baths previously existing in Fort St. George, and is freely taken advantage of by the men, to whose comfort it supplies a great and much wanted addition.

Mysore Circle.—The lavatory accommodation in Bangalore is very bad, and so also is the water supply. The wells from which the drinking water is obtained are contaminated, as pointed out by Assistant-Surgeon Innes, in charge of the 2nd Battalion 10th Foot, by percolation of surface impurities; but far more, I believe, by soakage from the main sewer of the bazaar which passes close to them. Steps are being taken by paving the surface around each well to prevent future contamination from the first of these sources. The water tastes well, but it has been ascertained by chemical analysis to be exceedingly impure. Steps are being taken to provide a much more ample supply of water for baths and lavatories, and several plunge baths are to be built.

Hyderabad Circle.—During the past year some of the lavatories were not supplied with water while alterations and repairs were going on.

Burmah Circle.—The ablution houses are near the barracks, and well supplied with water. Plunge baths should be an appendage to every barracks.

Presidency Circle.—Few complaints are made of the drainage of the several stations, which, except at Fort St. George, is for the most part superficial. *Drainage.*

Mysore Circle.—Faulty; a comprehensive scheme is under consideration of Government.

Hyderabad Circle.—Drainage is being gradually rendered more efficient. Saucer drains have been constructed along the south-western aspect of Nos. 1 and 2 blocks, and the ground sloped towards them. A surface drain has been made to carry off water from the immediate vicinity of the large well where there had been accumulations previously, which had most probably, to a certain extent, found their way into the well by percolation. Drains have been placed to prevent storm water from collecting and saturating the ground near the band-room and in front of the tailors' shop.

Although the storm water is now carried off more effectually, and does not overflow verandahs and run into barrack-rooms as formerly, more might yet be done towards efficient drainage. Every attempt to drain the precincts of the hospital properly has utterly failed hitherto.

Burmah Circle.—Dr. Shelton says, "I know of no instance in which the drainage is not good."

Presidency Circle.—The latrines in Fort St. George are situated on the berm on the outside of the wall, on the landward side, and so close to it that in the afternoon they are unbearably and dangerously hot. The dry earth system of conservancy has been introduced into them, and with an excellent effect. An entire absence of offensive smell is secured by it, and the removal of the "poudrette" is effected with a like absence of unpleasantness to the neighbourhood; while all risk of injurous contamination of air or water by fœcal decomposition or percolation is of course effectually prevented. *Latrines.*

Madras. The same system has been introduced with equally good effect in the latrines at the general hospital where, under the old system, in spite of every care they used to be "odiously offensive." The "dry earth system" has also been introduced at Wellington and Trichinopoly; though the means for carrying it out are not at either station equal to those at Fort St. George, and its efficient introduction in all military latrines in India, appears to me to be one of the chief sanitary requirements of the time.

Mysore Circle.—Dry earth and coal tar freely used—condition satisfactory.

Hyderabad Circle.—Defective conservancy should be remedied. The dry earth system exists in its entirety in one corps (2nd Battalion 21st Regiment) only. It should be introduced throughout the stations.

Burmah Circle.—The subject of the dry earth system of conservancy in latrines is being actively ventilated, and I have but little doubt the system will be fully carried out. Indeed it is now in partial operation in many corps, being carried out under regimental management.

Bedding and Clothing.

Presidency Circle—Iron cots have been largely introduced, and steps have been taken to provide every man with one. That, however, must necessarily be a work of time; and in the meantime "boards and trestles" are still in use by some of the men at Trichinopoly and Saint Thomas's Mount. A straw mattress (for which the substitution of a coir one would be a great improvement), a couple of blankets and sheets, and a rug, are provided for each man; the articles supplied being generally good of their kind. The addition of a pillow or bolster as recommended by the Sanitary Commission is much required.

The clothing comprising, as it now does, a cloth suit, a serge suit, and a white cotton suit, is well adapted for every variety of weather. The Artillery do not possess a serge suit and it is a serious want.

Mysore Circle.—The clothing of the men is generally reported to be well suited to the climate, station, and season of the year. Dr. Macbeth, however, suggests that the men of the 16th Lancers should be provided with a loose woollen blouse or stable jacket, to be worn when they go to groom their horses, more particularly after a field day. The suggestion appears to me an excellent one, and something of the same kind is equally required for the Artillery,* whose comfort would also be greatly promoted if they were supplied with trousers of some texture intermediate between white drill and thick woollen cloth.

Hyderabad Circle.—This is pre-eminently one of those stations in which flannel should be worn next the skin at all times. The changes of temperature, especially in the rainy season, are sometimes very sudden, and to this circumstance the frequency of dysentery and liver disease, and relapses at Secunderabad, is probably due in numerous instances during the monsoon.

The Cavalry and Artillery would be much more comfortable in loose serge tunics during the hot season, than in the tight jackets which they then wear; and at that time of the year the small forage cap ought only to be worn before sunrise and after sunset. Generally speaking the clothing is well adapted to the climate and seasons for men in health, but the articles issued for the use of the sick are unsuited for the rainy and cold weather, and are only adapted to the warm months of the year. All the Medical Officers in charge of Her Majesty's British troops agree in this opinion.

The best description of iron barrack cot at this station is that in possession of the 2nd Battalion 21st Fusiliers. It is even wider by 2½ inches than the generality of hospital cots, and is as good a barrack bedstead as can be wished for, although there are many other patterns in use, some of which are perhaps nearly equally convenient. Some boards with trestles are still issued and need no remark. Until the coir mattresses can be introduced into barracks in such numbers as to admit of sufficiently frequent change, so that the fibre can be taken out and washed as well as its ticking case, I am of opinion that the present paillasses, stuffed with 20 lbs. of straw, in very general use at this station, are the most comfortable mattresses. In the cold season, two blankets should form a part of the bedding of every man. A pillow ought to be issued with each paillasse; at present the men have to provide themselves with pillows.

* Sanctioned *vide* G. O. C. C. in India, No. 213, dated Simla, 20th July, 1868.

Madras.

Burmah Circle.—The clothing of the men is excellent, and of such kind as duly to meet the variety of climate. Much care is exercised by officers commanding on this head.

Rations.

Presidency Circle.—The rations are generally stated to have been as good as could reasonably have been expected from the circumstances, as to pasture, &c., at the several stations; but at Fort St. George the mutton is always very poor, and at Trichinopoly, Dr. Barclay found it to be worse than any that he had ever before seen issued to troops. An improvement in the quality of the meat generally is much required; and a real improvement can only be effected by stall-feeding the animals for slaughter. The bread supplied is generally good. So also are the potatoes; but they now constitute only half of the vegetable ration, instead of three-fourths of it as they used to do a few years ago.

In Fort St. George the diets are cooked in iron ranges, which are found to be well adapted for the purpose, and to economise fuel, besides affording ample means for varying the modes of cooking. Elsewhere in the Circle they are generally cooked in tinned copper utensils, over open fire-places of native fashion, the directions of the men constituting each mess being followed as to the mode of cooking. Considering the appliances available, the result is for the most part wonderfully satisfactory, and there is no lack of variety in the manner in which the diets are sent up; but the erection of suitable ranges in all cook houses is much to be desired.

Mysore Circle.—The rations are generally reported to have been of fair quality; the meat, however, being sometimes poor. In most barracks the cooking is still done over open fire-places of native fashion, but, in some, stoves have been introduced with advantage, and their general introduction is much to be desired.

Hyderabad Circle.—Dr. Marlow states that the ration meat at Madras and Poonamallee cannot be compared with that issued by the Commissariat Department in this Circle. "The only fault that can reasonably be found with either "beef or mutton is, that it is lean during the period of the year when the "pasturage is scanty." This might be remedied by feeding the cattle in certain months. It has been said that the dieting at Secunderabad is not sufficiently nutritive, and that from this cause the soldier is "under par"; I can only give a qualified assent to this opinion, and only so far as the vegetable element is concerned. Where there is so little call for sustained muscular exertion, I am not inclined to advocate any increase in the animal portion of the diet in a tropical climate; a better supply of vegetables in the hot season, and in the cold the issue of mutton more frequently, together with the means of varying the meals throughout the year by suitable cooking apparatus, would go far to meet most of the requirements at this station as regards food.

Burmah Circle.—The mode of cooking at present employed is very imperfect, and the quality of the meat is not unfrequently taken exception to, where the fault lies in the cooking. Great pains are taken to supply vegetables, to the growth and cultivation of which the Burmese have not, as a rule, bestowed much care; and yams, sweet potatoes, knole-khole, and pumpkins, are supplied when round potatoes and preserved potatoes are not available. On the whole the supply of food to the soldiers is satisfactory, and equal to that furnished throughout India generally as a ration. The Government of India has been applied to for sanction to supply at once to the European barracks and hospitals in the Pegu Division at least, (if not generally), Duff's cooking ranges, or such other stoves as experience in the Bengal Presidency may have shown to be preferable.—*Paymaster-General, No.* 395, *dated* 11*th October*, 1867.

Canteen Supplies.

No fault, as a rule, has been found with beer, porter, rum, and arrack, supplied by the Commissariat Department. All other supplies are furnished regimentally.

Hospitals.

Presidency Circle.—The hospital accommodation in the Presidency Circle, though far from perfect, is everywhere ample as regards cubic and superficial space; and there has been no overcrowding during the year. The sick of the Regiment of Infantry and the two Batteries of Artillery in Fort St. George, are still accommodated in a part of the general hospital, on the banks of the Coom; a new military hospital is sanctioned by Government, but has not yet been commenced, on account of my objection to the proposed site.

Madras. The hospital for the Royal Artillery, at St. Thomas's Mount, is built on a very faulty plan, the wards being everywhere double, a wall with arched openings intervening between each two; but it is well ventilated, so far as a hospital so built can be well ventilated; and the accommodation contained in it is sufficient to afford much more than the usual amount of cubic and superficial space per man. Considerable progress has been made during the year in the erection of a new female hospital, which is much required.

The arrangements for supplying the hospital with water, though they have been long in progress, are still far from complete.

At the invalid depôt, at Poonamallee, the hospital accommodation is as wretched as it well could be; but as the station is to be given up, its faults need not be dwelt upon. The invalids sent there being now comparatively few, ample space can be allotted to each.

At Wellington the hospital is in every respect admirably constructed, and it is far more than sufficient for the present strength of the depôt. That at Trichinopoly, though old-fashioned and low, is fairly ventilated, and having been built for a full regiment of infantry, it affords unlimited space for the sick of the small European garrison now maintained there.

Mysore Circle.—The hospitals are generally of inferior construction and badly arranged. Several (those at Cannanore, and for the cavalry at Bangalore, for instance) being in the form of a square. The infantry hospital at Bangalore is more objectionable still. New hospitals for all the corps at that station are, however, either being built or to be built very shortly.

Hyderabad Circle.—The sick of the two infantry regiments quartered at North and South Trichinopoly are at present treated in one building, (the position of which has been above indicated), originally intended for the sole use of the 1st East India Regiment. Its site is a most excellent one, but nothing can be said in favour of the edifice itself, upon which so much adverse criticism has been lavished during the last ten years, that further remark would amount to a mere repetition of the long catalogue of faults which were first pointed out by Dr. Cashman, Royal Artillery; quoted by Dr. Crawford in his Report on the hospital in the Army Medical Blue Book for 1860, and repeated in part in the Report by the Sanitary Commission for Madras, 1865. At present the upper story of the building is occupied by the 2nd Battalion 10th Regiment, and the lower by the 2nd Battalion 21st Fusiliers.

The accommodation is wholly insufficient for two infantry regiments of full strength, except in the most favourable seasons.

Dr. Ramsbotham, Assistant-Surgeon B Battery, 14th Brig., Royal Artillery, thus describes the accommodation at present available for the sick of the whole of the Royal Artillery at this station. "At the beginning of the year "(1867) a building in rear of the soldiers' reading-room, which had been "used as a canteen and coffee-room by the 108th Regiment, was handed over "for a temporary Royal Artillery hospital at Trimulgherry, after the neces- "sary alterations to adapt it for this purpose had been made by the Public "Works Department. It has answered admirably, and is much better adapted "for a hospital than the large general hospital now only used by the two "European infantry regiments stationed at Trimulgherry. The general con- "struction is nearly the same as that of the barrack blocks."

Burmah Circle.—The hospitals are suitable, and are clean and regular. That of the A Battery, 23rd Brigade, Royal Artillery, Thayetmyo, is an exception. Dr. Shelton has recommended it to be abandoned; and another building is being prepared for the sick.

III. Bombay.

Bombay.

During the year the average strength of the European troops in the Bombay Command was 11,866; the admissions into hospital amounted to 15,294, and the deaths to 228, to which must be added 22 of invalids on their passage to England and at Netley, making a total of 250. The admissions were in the ratio of 1,289, and the deaths of 21·07 per 1,000 of mean strength, the former being lower, and the latter one-third higher than in 1866.

The following Table, framed from Abstract No. 27 in Appendix, shows the influence of the different classes of diseases in causing sickness and mortality in this Command :—

Order.	Diseases.	1867. Strength, 11,866. Admissions.	Deaths. In India.	Deaths. Of Invalids.	Deaths. Total.	1867. Ratio per 1,000. Admitted.	1867. Ratio per 1,000. Died.	1860–66. Ratio per 1,000. Admitted.	1860–66. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	6,955	119	4	223	586·1	10·36	860·3	12·12
2	Enthetic „ ..	2,489	2	..	2	209·8	·17	262·7	·28
3	Dietic „ ..	284	6	..	6	23·9	·51	19·8	·19
4	Parasitic „ ..	84	..	..	..	7·1	..	11·3	..
	Class II.								
1	Diathetic Diseases ..	151	1	1	2	12·7	·17	9·6	·21
2	Tubercular „ ..	104	6	8	14	8·8	1·18	10·2	2·06
	Class III. Diseases of the—								
1	Nervous System ..	455	12	1	13	38·4	1·10	33·5	1·43
2	Circulatory „ ..	127	13	4	17	10·7	1·43	12·8	·79
3	Respiratory „ ..	534	5	1	6	45·0	·51	48·9	·87
4	Digestive „ ..	1,303	37	2	39	109·8	3·29	117·3	3·23
5	Urinary „ ..	26	..	..	..	2·2	..	2·6	·08
6	Reproductive „ ..	173	..	..	..	14·6	..	11·9	..
7	Locomotive „ ..	43	..	..	..	3·6	..	5·0	·01
8	Integumentary „ ..	1,206	..	..	..	101·6	..	97·7	·10
	Class IV.								
4	Diseases of Nutrition.	131	..	1	1	11·0	·08	5·9	·15
	Class V.								
1	Accidents	1,213	18	..	18	102·2	1·51	95·5	1·58
3	Homicide	1	..	..	..	·1	..	..	·06
4	Suicide	1	9	..	9	·1	·76	·1	·41
5	Execution	..	..	..	..	..	..	..	·02
6	Corporal Punishment	13	..	..	..	1·1	..	1·6	..
	Diseases not specified	1	..	..	..	·1	..	·8	·10
	Total	15,294	228	22	250	1288·9	21·07	1607·5	23·69

The admissions and deaths have been under the average of the preceding seven years, the reduction in the former having taken place chiefly in miasmatic and enthetic, and in the latter in miasmatic diseases.

Miasmatic Diseases were considerably less prevalent than in 1866, but the mortality was more than doubled. The admissions and deaths by the principal diseases in this class were as follows :—

Bombay.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1867. Admitted.	1867. Died.	1860–66. Admitted.	1860–66. Died.
Eruptive Fevers	8	..	·7	..	1·8	·21
Paroxysmal „	3,926	13	330·9	1·09	477·4	1·73
Continued „	402	22	33·9	1·85	97·0	1·14
Dysentery and Diarrhœa	1,088	25	91·7	2·10	134·0	3·03
Spasmodic Cholera..	90	58	7·6	4·88	8·5	5·27
Sorethroat and Influenza	250	1	21·1	·08	20·6	·01
Ophthalmia	486	..	40·9	..	51·5	..
Rheumatism.	552	..	46·5	..	61·1	·05

Eruptive Fevers.—There were only eight admissions by this group in the whole force,—four by smallpox and four by measles.

Paroxysmal Fevers were slightly under the proportion in 1866, but the mortality was a little above it.

Continued Fevers.—The admissions by fevers of this type amounted to little more than one-third the proportion in 1866, which was slightly under the average.

Dysentery and Diarrhœa were considerably less prevalent than in the preceeding year, and were one-third under the avearge.

Spasmodic Cholera.—The admissions and deaths by this disease were slightly under the average of the preceding seven years. It did not prevail as an epidemic generally throughout the Command, but broke out in the 2nd Battalion 1st Regiment at Nusseerabad with great severity in the month of September.

Ophthalmia continues to diminish steadily. As in the preceding year, the 95th Regiment had the highest proportion of cases, the ratio of admissions having amounted to 98·9 per 1,000 of the strength.

Enthetic Diseases.—The ratio of admissions has been a trifle higher than in 1866; it is exactly the same as in Bengal, and a little lower than in Madras.

Tubercular Diseases.—The mortality by this class, which was noti ed as being unusually great in 1866, has fallen below the average of the last seven years, and this has not been counterbalanced by any increase in the diseases of the respiratory system, the deaths by which were under the ratio of the preceding year.

Accidents and Violence.—In this class are included 29 cases of sunstroke or heat apoplexy, of which 11 died, being slightly in excess of 1866. The suicidal deaths amounted to 9, of which 7 were by fire-arms and 2 by cut-throat. They amounted to nearly twice the average of the preceding seven years.

The following Table shows the admissions and deaths during the year at each of the principal stations in the Command:—

Military Divisions.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000.	
					Admitted.	Died.
Presidency ..	Colaba	475	574	8	1,208·4	16·84
Poona ..	Poona..	2,117	2,803	25	1,324·1	11·81
	Sattara.	193	254	1	1,316·1	5·18
	Ahmednuggur ..	495	514	1	1,038·4	2·02
	Asseerghur . ..	120	88	1	733·3	8·33
	Belgaum	1,015	1,341	8	1,321·2	7·88
	Kirkee	509	571	3	1,121·8	5·89
	Sholapoor	130	201	2	1,546·2	15·38
Mhow ..	Mhow	1,338	2,060	25	1,539·6	18·68
	Indore	79	127	1	1,607·6	12·66
	Neemuch	381	627	4	2,231·3	14·23
	Nusseerabad ..	717	1,230	85	1,715·5	118·55
	Ajmere.	47	117	2	2,489·4	42·55
Northern ..	Deesa	830	851	12	1,025·3	14·46
	Ahmedabad. ..	256	530	8	2,070·3	31·25
	Mount Aboo ..	111	143	2	1,288·3	18·02
	Baroda.	20	..	1	..	50·00
Scinde ..	Kurrachee	922	1,516	7	1,644·2	7·59
	Hydrabad	340	698	6	2,053·0	17·65
	Aden	662	515	9	777·9	13·59
	Sanitaria & Invalids ..	472	1,267*	14	2,684·3	29·66
	On the March. &c.	184	126	3	684·8	16·30

* A large proportion of these were re-admissions of cases already accounted for at other stations.

The sickness has not been excessive at any of the stations, except Ajmere, Neemuch, Ahmedabad, and Hydrabad. The mortality was extremely high at Nusseerabad, and was also greatly above the average at Ajmere, and Ahmedabad.

The influence of the different classes of diseases in producing sickness and mortality in each of the military divisions, is shown in the following Table :—

Bombay.

Order.	Military Divisions ...	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on March		Annual Ratio per 1,000 of Strength.										Troops on March.	
	Average Annual Strength	475		4,579		2,462		1,197		1,262		662		184		Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.			
	Disease.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																										
1	Miasmatic Diseases ...	206		2060	13	2446	87	713	5	1066	3	264	3	82	1	431·6	4·21	449·9	2·93	993·1	25·34	595·7	4·18	843·9	2·38	298·8	4·53	445·7	5·43
2	Enthetic ,, ...	45	...	1440	1	407	...	221	...	209	...	48	...	10	...	94·8	...	314·5	·22	165·3	...	184·6	...	165·6	...	72·5	...	54·4	...
3	Diatic ,, ...	7	...	165	4	47	1	20	...	39	...	2	...	1	...	14·7	...	36·0	·87	19·1	·41	16·7	·84	30·9	...	3·0	...	6·4	...
4	Parasitic ,, ...	5	...	26	...	13	...	13	...	27	...	1	...	...	...	10·5	...	5·7	...	5·3	...	10·9	...	21·4	...	1·5	...	...	...
	Class II.																										
1	Diathetic Diseases ...	4	...	65	1	21	...	14	...	28	...	8	...	...	...	8·4	...	14·2	·22	8·5	...	11·7	...	22·2	...	12·1	...	...	...
2	Tubercular ,, ...	13	...	26	1	27	1	11	1	4	...	1	...	1	1	27·4	...	5·7	·22	11·0	·41	9·2	·84	3·1	...	1·5	...	5·4	5·43
	Class III.																										
	Diseases of the—																										
1	Nervous System ...	23	...	146	7	106	1	55	3	75	1	23	...	1	...	48·4	...	31·9	1·53	42·7	·41	46·0	2·50	59·4	·79	34·7	...	5·4	...
2	Circulatory ,, ...	6	1	35	2	22	2	28	4	18	2	2	...	...	...	12·6	2·11	7·6	·44	8·9	·81	23·4	3·34	14·3	1·58	3·0	...	...	...
3	Respiratory ,, ...	10	...	152	...	189	2	87	...	92	2	17	1	7	...	21·1	...	33·2	...	76·8	·81	30·9	...	72·9	1·58	25·7	1·51	38·0	...
4	Digestive ,, ...	82	3	488	10	297	14	119	3	242	2	43	1	14	...	172·6	6·31	106·6	2·18	120·6	5·68	99·4	2·50	191·8	1·58	65·0	1·51	76·1	...
5	Urinary ,, ...	2	...	12	...	2	...	4	...	5	...	2	...	...	...	4·2	...	2·6	...	·8	...	3·3	...	4·0	...	3·0	...	...	...
6	Reproductive ,, ...	23	...	66	...	40	...	15	...	18	...	1	...	...	...	43·4	...	14·4	...	16·2	...	12·5	...	14·3	...	1·5	...	...	...
7	Locomotive ,, ...	4	...	12	...	8	...	8	...	11	...	2	...	1	...	8·4	...	2·6	...	3·3	...	6·7	...	8·7	...	3·0	...	5·4	...
8	Integumentary ,, ...	88	...	462	...	314	...	130	...	149	...	54	...	5	...	174·8	...	100·9	...	127·5	...	108·6	...	117·3	...	81·6	...	27·2	...
	Class IV.																										
4	Diseases of Nutrition ...	5	...	39	...	30	...	25	...	11	...	...	...	...	...	10·5	...	8·5	...	12·2	...	20·9	...	8·7	...	...	...	...	...
	Class V.																										
1	Accidents	55	2	572	...	193	7	108	4	217	1	47	3	4	1	115·8	4·21	124·9	...	78·4	2·84	90·2	3·34	171·9	·79	71·0	4·53	21·7	5·43
2	Homicide	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	·7	...	...	...	...	...
3	Suicide	...	...	...	2	...	2	...	1	2	3	...	1	...	...	...	...	...	·44	...	·81	...	...	1·6	2·38	...	1·51	...	...
4	Corporal Punishment ...	1	...	6	...	1	...	3	...	2	...	...	...	...	...	2·1	...	1·3	...	·4	...	2·5	...	1·6	...	...	...	...	...
6	Not yet diagnosed ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2·1	...	...	...	...	...	...	...	...	...	...	...	...	...
	Total	574	8	5772	41	4161	117	1624	22	2214	14	515	9	126	3	1208·4	16·84	1260·5	8·95	1690·1	47·52	1273·2	16·38	1754·3	11·08	777·9	13·59	684·7	16·29

Bombay.

The admissions have been higher than in 1866 in the Presidency, Mhow and Scinde Divisions, and the deaths in the Mhow, Northern, and Scinde, and among Troops on the March: in the other divisions there has been a reduction in both sickness and mortality.

MIASMATIC DISEASES when subdivided give the following results:—

Bombay.

Military Divisions ...	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.		Annual Ratio per 1,000 of Mean Strength.															
															Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.	
Average Annual Strength ...	475		4,679		2,462		1,197		1,262		662		184															
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers ...	...	...	2	...	1	...	...	...	...	...	3	...	...	...	...	...	·4	...	·4	...	...	...	...	...	4·5	...	...	...
Paroxysmal ,, ...	...	111	...	1071	5	1544	5	486	2	598	1	30	...	57	...	233·7	...	233·9	1·09	627·1	1·22	406·0	2·51	473·8	·79	45·3	...	309·8	...
Continued ,, ...	...	4	...	184	1	56	18	3	2	...	...	132	1	5	...	8·4	...	40·2	·22	22·8	7·31	2·5	1·67	...	...	199·4	1·51	27·1	...
Dysentery and Diarrhœa ...	33	2	297	7	382	10	81	...	189	2	60	...	15	1	69·5	6·31	64·9	1·52	155·2	4·06	67·7	·83	149·8	2·37	80·6	...	81·5	5·43
Spasmodic Cholera ...	...	...	1	...	70	55	1	1	...	...	2	2	...	...	...	...	·2	...	23·4	22·34	·8	...	...	...	3·0	3·02	...	...
Sorethroat and Influenza ...	9	...	95	...	68	1	18	...	59	...	3	...	...	...	18·9	...	20·7	...	27·6	·40	15·0	...	46·8	...	4·5	...	...	...
Ophthalmia ...	16	...	173	...	149	...	57	...	59	...	19	...	2	...	33·7	...	37·8	...	60·5	...	47·6	...	46·8	...	28·7	...	10·9	...
Rheumatism ...	15	...	196	...	154	...	48	...	127	...	5	...	2	...	31·5	...	42·8	...	62·6	...	40·1	...	100·6	...	7·6	...	10·9	...

Paroxysmal Fevers were less prevalent than in 1866 in the Presidency and Poona, but more prevalent in the other divisions. The increase was most marked in the Northern and Scinde Divisions, but in the former it was more than counterbalanced by a reduction in fevers of the continued type. In the Northern the great prevalence of paroxysmal fevers was in the Royal Artillery at Ahmedabad, and the 49th Regiment at Deesa. The latter corps which had a remarkably high proportion of cases of continued fever at the same station in the preceding year, returned only three cases of that type during the year under review. In the Scinde Division, paroxysmal fevers were very prevalent at both Hyderabad and Kurrachee, at the former in the Artillery and the detachment of the 2nd Regiment, and at the latter in the Artillery and the 33rd Regiment. The Mhow Division, as in former years, had the highest ratio of admissions by these fevers. The 95th Regiment at Mhow had 659 admissions in a strength of 819 men; the 11th Hussars at the same station, the Artillery at Neemuch, and the 2nd Battalion 1st Regiment at Nusseerabad and Ajmere also had a very high ratio of admissions, while the Artillery at Mhow and Nusseerabad escaped with a comparatively small number of cases. *Bombay.*

Continued Fevers were not a source of much sickness except at Aden, where the ratio of admissions by them amounted to 199 per 1,000 of the strength, but they were not of a severe form, only one case having terminated fatally at that station. But although continued fevers were not the cause of much sickness, they gave rise to an unusually high ratio of deaths in the Mhow Division, confined chiefly to the 11th Hussars at Mhow and the 2nd Battalion 1st Regiment at Nusseerabad. The former corps had 16 cases, of which 6 died; and the latter 25 cases, with 12 deaths. The cases in the 1st Regiment occurred chiefly in May, June, and July, and in the 11th Hussars in August and September.

Dysentery and Diarrhœa were less prevalent than in 1866 in all the divisions except Mhow and Scinde.

Spasmodic Cholera prevailed as an epidemic at the station of Nusseerabad only, and it was confined almost entirely to the 2nd Battalion 1st Regiment. The first case among the men occurred on the 3rd of September, and the last on the 29th, and in that short space of time there were 62 cases and 49 deaths by cholera among the men. Five cases and three deaths occurred in the F Battery 14th Brigade Royal Artillery, quartered also at Nusseerabad. On the outbreak of the epidemic the troops were moved into camp, and the camps were frequently changed during the 26 days of the prevalence of the disease. The progress of the epidemic was checked in the Artillery after the first move, but the measure was not attended with the same success in the infantry regiment. In neither of the corps were the officers attacked. In the Artillery no case occurred among the women, and only one, which however proved fatal, among the children; in the 1st Regiment there were 11 cases and 8 deaths among 81 women, and 13 cases and 12 deaths among 119 children.

Ophthalmia was more prevalent than in 1866 in the Mhow Division, but this was due to the arrival at Mhow, from Kurrachee, of the 95th Regiment, in which ophthalmia had been very prevalent during the four preceding years. The admissions in this corps were not so numerous as in 1866, but they still amounted to 10 per cent. of the strength.

Enthetic Diseases were considerably more prevalent than in 1866 in the Poona Division, the results differed very little in the Northern and Scinde Divisions, and there was a marked decrease in all the others. The increase in the Poona Division was due to the prevalence of these diseases in the 26th Regiment at Belgaum. In a strength of 846 men there were 612 admissions, being in the ratio of 723 per 1,000. The cases were chiefly syphilitic, 285 being recorded as primary syphilis, 102 as secondary, and 108 as Bubo, while there were only 113 of gonorrhœa, 3 of orchitis, and 1 of stricture. Omitting the 26th Regiment, the ratio of admissions by these diseases in the Poona Division amounted to 222 per 1,000, being under the proportion in 1866, but higher than in any of the other divisions.

Diseases of the Digestive System were more prevalent than in 1866 in the Presidency, Mhow, Northern, and Scinde Divisions, and were the cause of a higher rate of mortality in all the Divisions. The increase of the admissions was

Bombay. most marked in cases of dyspepsia, and that of the deaths was caused by inflammation of the liver.

ACCIDENTAL AND VIOLENT DEATHS.—In this class are included 11 deaths from sunstroke; 3 of these occurred at Aden in May, and 3 at Deesa, 2 in June, and 1 in July. Nusseerabad furnished 2, and Mhow and Hydrabad 1 each; the eleventh occurred on the line of march.

The following Table shows the admissions and deaths in each corps serving in the Command:—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In Bombay.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
2nd Dragoon Guards	36	12	1	..	1	333·3	27·78	On the march, ½ month.
3rd „ „	408	378	1	..	1	926·5	2·45	Ahmednuggur, 12 months.
4th Hussars	40	76	..	..	..	1900·0	..	Arrived from England; Deolalee, 1 month.
11th „	449	736	16	..	16	1639·2	35·63	Mhow, 11 months; on the march, 1.
Total Cavalry	933	1,202	18	..	18	1288·3	19·29	
ROYAL ARTILLERY.								
E Brigade, R. H. A.	540	608	3	2	5	1125·9	9·26	A Battery, Kirkee, 12 months. B „ Ahmednuggur, 12 months. C „ Kirkee, 12 months. D „ Mhow, 12 months.
14th Brigade, R. A.	581	835	21	..	21	1437·2	36·14	Head-Quarters and D Battery, Ahmedabad, 12 months. E Battery, Deesa, 12 months. F „ Nusseerabad, 12 months. G „ Hydrabad, 10½ months; Kurrachee, ½ month; embarked for Abyssinia.
18th „ „	850	1,428	10	4	14	1680·0	16·47	A Battery Kurrachee, 12 months. B „ Ahmedabad, 12 months. C „ Belgaum, 12 months. D „ Kirkee, 12 months. E „ Sholapoor, 12 months. F „ Neemuch, 12 months.

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
ARTILLERY—*cont.*								
21st Brigade, R.A.	397	309	4	..	4	778·3	10·08	Head-Qrs. and No. 6 Battery, Mhow, 12 months. No. 1 Battery, on the march, ⅔ month; Aden, 11⅓ months. No. 2 „ Kirkee, 11⅓ months; Embarked for England. No. 3 „ Aden, 1 month; Kirkee, 10⅓ months; embarked for Abyssinia. No. 4 „ Aden, 12 months. No. 5 „ Belgaum, 11⅓ months; embarked for Abyssinia.
Total Artillery	2,368	3,180	38	6	44	1342·9	18·58	
INFANTRY.								
2nd Battalion, 1st Foot	687	1,219	82	..	82	1774·4	119·36	On the march, ⅔ month; Nuseerabad, 11⅓ months.
1st „ 2nd „	773	939	9	..	9	1214·7	11·64	Aden, 12 months; Detachment at Hydrabad.
1st „ 4th „	834	889	9	1	10	1066·0	11·99	Colaba, 11⅓ months; Detachments at Sattara and Asseerghur; embarked for Abyssinia.
26th Regiment	846	1,153	6	..	6	1362·9	7·09	Belgaum, 12 months.
33rd „	789	1,157	11	4	15	1466·4	19·01	Kurrachee, 10⅔ months; embarked for Abyssinia.
35th „	40	29	2	..	2	725·0	50·00	Arrived from Mooltan; Kurrachee, 1 month; embarked for England.
45th „	831	1,118	7	6	13	1345·4	15·64	Poona, 12 months.
49th „	847	883	15	..	15	1042·5	17·71	Deesa, 12 months; Detachment at Mount Aboo.
95th „	819	1,281	8	1	9	1564·1	10·99	On the march, ⅓ month; Mhow, 11⅔ months; Detachment at Indore.
96th „	758	1,053	8	1	9	1389·2	11·87	Poona, 12 months; Detachment at Neemuch.
108th „	65	89	11	..	11	1369·2	169·23	Arrived from Madras; Poona and Colaba, 1 month.
109th „	776	930	5	3	8	1198·5	10·31	Poona, 10 months; Kurrachee, ⅔ month; Proceeded to Bengal; Detachment remained at Kurrachee till end of year.
Total Infantry	8,065	10,740	173	16	189	1331·6	23·43	

The ratio of admissions has been lowest in the Cavalry, and highest in the Artillery; but the latter has very slightly exceeded the Infantry. The mortality has been lowest in the Artillery, and highest in the Infantry. The 1st Foot had an enormously high ratio of deaths from the prevalence of cholera, and the 108th a still higher ratio for the short period it was in the Command. The latter corps arrived in Bombay, from Secunderabad, on the 23rd of November, in a very sickly condition, and before the end of the year lost 11 men, of whom 5 died from hepatic disease, and 2 from intemperance. *Bombay.*

Of the regiments in the Command during the whole year, excepting the 2nd Battalion 1st Foot, the 14th Brigade Royal Artillery had the highest ratio of deaths, and the 11th Hussars had but a trifle lower. In the latter it was caused by the prevalence of fever at Mhow, as already stated. The 3rd Dragoon Guards, at Ahmednugger, had the lowest ratio of deaths, and next to it was the 26th Regiment at Belgaum.

SANITARY REPORT.

Inspector-General Gordon, C.B., in his Sanitary Report of the troops serving at the different military stations in this Command, arranges his remarks under the following heads:—

Barracks.—During the year, considerable progress was made throughout the Presidency in the construction of new barracks, and in the adaptation of the old buildings to the conditions requisite for the preservation of health.

Accommodation.—According to the reports of the Medical Officers, the accommodation both in barracks and hospitals was generally above the average allowed by Regulation.

Upper Stories.—With regard to the construction of new barracks and hospitals, I would strongly recommend that all such buildings in future be upper storied.

Flooring.—The flooring of the existing barracks in many instances is of an objectionable kind, being formed of mud and cow-dung. In the rainy season such floors are always damp, and in the dry season they give rise to much dust unless they are frequently coated with cow-dung. All such flooring ought to be discontinued, and the barrack-rooms should be flagged or tiled.

Ventilation.—The ventilation of the barracks and hospitals is generally efficient.

Ablution Accommodation.—The ablution accommodation is reported to be generally sufficient, and the supply of water ample.

Latrines.—In the latrines the dry earth system of conservancy has been thoroughly carried out with excellent results; but McDougall's disinfecting powder has been used in addition, both in barracks and hospitals, when deemed necessary.

Cook-Rooms.—The construction of chimnies in the cook-rooms both of barracks and hospitals has been steadily carried on, and constitutes a great and manifest improvement.

Dieting.—The dieting of the troops has been quite satisfactory, and the Commissariat arrangements appear to meet with general approval. The new scale of dieting for prisoners imprisoned for more than four weeks, and with hard labour, is favourably reported on.

Water Supply.—The water in this Presidency is generally good, its principal impurities arising from the mode of carrying it from the wells, and storing it for use. The existing system of straining it through sand and charcoal is of no use, and I would urge that really efficient filters be procured, especially for such stations as Kirkee and Poona, where the water contains much organic matter, and Nusseerabad and Kurrachee, where it has a strong saline impregnation.

Clothing.—For the Infantry the clothing in use appears to be unexceptionable; but for the Cavalry and Artillery I consider a change to be urgently required. In these corps the men still wear in the rainy and cold seasons,—and at night on guard, even in the hot season,—the thick heavy cloth

Bombay. garments, such as they wear at home, which are unquestionably too hot and tight-fitting to be conducive to health or comfort. It seems to me that serge clothing might be adopted for the Cavalry and Artillery in this country quite as well as for the Infantry, for it has been already proved in China and elsewhere that serge, although certainly not so durable as cloth, is nevertheless well enough suited as a dress in which to perform the Artillery exercises.

The number of cases of sunstroke which have occurred during the year would appear to lend some colour to the suspicion that the helmet now worn does not afford a sufficient amount of protection to the head and neck against the rays of the sun, still I have not been able to gather any positive evidence in the reports of the Medical Officers upon this important point.

Section II.

On the Extent of Invaliding.

India. The number of invalids sent to England during the year was—from Bengal 1,637, or 47·81 per 1,000 of mean strength; from Madras 586, or 54·29 per 1,000; and from Bombay 523, or 44·08. These ratios correspond very closely with the results for the preceding year. The number of invalids from India finally discharged the service at Netley amounted to 1,145, being 20·12 per 1,000 of the strength, and slightly under the proportion in 1866.

The following Table, framed from Abstract No. 28 in Appendix, shows the influence of the different classes of diseases in producing the disabilities of the invalids:—

India.

Order.	Disabilities of	Invalids sent home from Bengal.	Madras.	Bombay.	Invalids from India discharged the service at Netley.
	Mean Strength	34,237	10,793	11,866	56,896
	Class I.				
1	Miasmatic Diseases—				
	Paroxysmal Fevers ..	113	16	17	6
	Continued „ ..	6	..	1	..
	Dysentery and Diarrhœa	85	64	21	14
	Sorethroat	1	..	..	..
	Ophthalmia	14	9	16	25
	Rheumatism	127	42	52	69
2	Enthetic Diseases	106	57	35	70
3	Dietic „	1	..	2	1
4	Parasitic „	..	..	..	2
	Class II.				
1	Diathetic Diseases ..	60	11	33	14
2	Tubercular „	132	57	44	252
	Class III.				
	Diseases of the—				
1	Nervous System ..	123	37	64	108
2	Circulatory „ ..	148	46	44	175
3	Respiratory „ ..	38	19	35	48
4	Digestive „ ..	274	110	76	148
5	Urinary „ ..	7	4	1	4
6	Reproductive „ ..	7	6	8	4
7	Locomotive „ ..	26	8	6	29
8	Integumentary „ ..	16	11	10	15
	Class IV.				
4	Diseases of Nutrition ..	315	75	43	129
	Class V.				
	Accidents	38	14	15	31
	Gunshot wound	..	..	..	1
	Total ..	1,637	586	523	1,145
	Ratio per 1,000 of mean Strength.. 1867	47·81	54·29	44·08	20·12
	Ratio per 1,000 of mean Strength.. 1861-6	37·27	44·19	33·97	18·69

The ratios, though considerably above the average of the last six years, differ little from those of 1866. Atrophy, the result of malarious disease, was the most frequent cause of invaliding in Bengal; next to it in Bengal, and the most frequent cause in Madras and Bombay, were diseases of the digestive system, and of these the most common was inflammation of the liver. Tubercular diseases were the most frequent cause of discharge from the Service, and those of the circulatory system rank next to them.

Section III.

Mean Daily Sick.

India. The mean daily sick in 1867 amounted in Bengal to 1851, in Madras to 668, and in Bombay to 749. On these numbers the calculations in the following Table have been made:—

	Bengal.		Madras.		Bombay.	
	1867.	1860-66.	1867.	1860-66.	1867.	1860-66.
Ratio per 1,000 constantly Sick ..	54·06	65·91	61·89	63·38	63·12	62·43
	Days.	Days.	Days.	Days.	Days.	Days.
Average Sick Time to each Soldier	19·73	24·06	22·59	23·13	23·04	22·79
Average Duration of Cases ..	14·03	13·82	16·29	16·57	17·88	14·18

Compared with the results for 1866, there has been a reduction in all these particulars in Bengal and Madras, and an increase in Bombay. Bengal shows a marked decrease in the average constantly sick and the sick time to each soldier, compared with the proportions in the preceding seven years. In Madras and Bombay the results do not differ greatly from the average, except in the duration of the cases in Bombay, which shows an increase of 3½ days.

Section IV.

On the Influence of Age on the Mortality.

The mortality at different ages in quinquennial periods among the soldiers serving in each of the Presidencies is shown in the following Table, framed from Abstract No. 29 in Appendix:—

	Under 20 years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.
Bengal	1,399	28	7,192	194	13,021	362	6,429	267	2,148	86	389	20
Madras	495	3	2,532	24	4,072	75	1,979	64	643	26	128	7
Bombay	889	7	2,660	51	3,335	65	2,055	60	719	25	128	4
Total	2,783	38	12,384	269	20,428	502	10,463	391	3,510	137	645	31
Ratio of Deaths per 1,000 of Strength ..	13·65		21·72		24·57		37·37		39·03		48·06	
Ratio of Deaths per 1,000 of Strength in— Bengal, 1862–6 Madras and Bombay, 1861-6 ..	6·27		15·49		24·64		31·04		42·47		57·42	

The mortality under 25, and between 30 and 35, was considerably above the average; from 25 to 30 the ratio was exactly the average; and above 35 there was a decrease. It is probable that the epidemic of cholera was, to some extent at least, the cause of the increase at the earlier ages.

XIII. ON THE HEALTH OF TROOPS ON BOARD SHIP.

STATISTICAL REPORT.

Troops on Board Ship.

The number of troops on board ship during the year, regarding whom returns have been received, was as follows:—

I.	Troops or drafts proceeding on foreign service	13,106
II.	Do. returning from foreign service	12,019
III.	Do. passing by sea from one colony to another, or from one station in a military Command to another	10,952
IV.	Invalids and "time-expired men" returning to England	4,392

I. Troops proceeding on Foreign Service.

During the year 1867 the number of men who embarked for foreign service amounted to 13,106, and represented an average *annual* strength of 1,502. During the voyage to their various destinations there were 1,013 cases of sickness and 5 deaths among them, being in the ratio of 674 and 3·33 per 1,000 of mean annual strength.

The admissions and deaths by classes of diseases among the men proceeding to the various foreign stations, are shown in the following Table, framed from Abstract No. 30 in Appendix:—

Troops on Board Ship.

Order.	Diseases.	To Mediterranean. Admitted.	Died.	Ratio per 1,000. Admitted.	Died.	To Cape. Admitted.	Died.	Ratio per 1,000. Admitted.	Died.	To India, Eastern Straits Settlements, and Ceylon. Admitted.	Died.	Ratio per 1,000. Admitted.	Died.	To India *vid* Egypt. Admitted.	Died.	Ratio per 1,000 Admitted.	Died.
	Stations																
	Number of men Embarked	5,673				1,267				2,339				3,827			
	Average *Annual* Strength	156				202				719				425			
	Class I.																
1	Miasmatic Diseases ...	14	...	89·7	...	19	...	94·2	...	103	1	143·2	1·39	72	...	169·4	...
2	Enthetic ,, ...	39	...	250·0	...	31	...	153·5	...	144	...	200·3	...	159	...	374·1	...
3	Dietic ,, ...	...	...	...	...	3	...	14·8	...	1	...	1·4	...	...	...	...	...
4	Parasitic ,, ...	1	...	6·4	...	2	...	9·9	...	2	...	2·8	...	4	...	9·4	...
	Class II.																
1	Diathetic Diseases ...	...	...	...	...	...	...	...	...	10	...	13·9	...	...	...	...	...
2	Tubercular ,, ...	2	...	12·8	...	...	...	...	...	7	1	9·7	1·39	...	...	...	...
	Class III. Diseases of the—																
1	Nervous System ...	...	...	...	...	1	...	4·9	...	20	2	27·8	2·78	8	...	18·8	...
2	Circulatory ,, ...	...	...	...	...	...	...	...	...	3	...	4·3	...	...	...	...	...
3	Respiratory ,, ...	5	...	32·1	...	3	...	14·8	...	32	...	44·5	...	27	...	63·5	...
4	Digestive ,, ...	2	...	12·8	...	3	...	14·8	...	42	...	58·4	...	9	...	21·2	...
5	Urinary ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2·4	...
6	Reproductive ,, ..	...	...	...	...	1	...	4·9	...	7	...	9·7	...	4	...	9·4	...
7	Locomotive ,, ...	...	...	...	...	1	...	4·9	...	1	...	1·4	...	1	...	2·4	...
8	Integumentary,, ...	5	...	32·1	...	15	...	74·3	...	61	...	84·8	...	42	...	98·8	...
	Class IV.																
4	Diseases of Nutrition...	...	...	...	...	...	...	...	...	4	...	5·6	...	...	...	...	...
	Class V.																
1	Accidents	8	...	51·3	...	10	...	49·6	...	53	1	73·7	1·39	27	...	63·5	...
6	Corporal Punishment	...	...	...	...	...	...	...	...	4	...	5·6	...	...	...	...	...
	Total	76	...	487·2	...	89	...	440·6	...	494	5	687·1	6·95	354	...	832·9	...

The admissions were highest among the troops proceeding to India by Egypt. This was principally from a number of cases of venereal disease among the men of the 5th Brigade Royal Artillery and the 4th Hussars, which came under treatment immediately after embarkation, and are stated by the Medical Officer of the Royal Artillery to have been contracted by the men on furlough from the corps shortly before embarkation.

The deaths all occurred among drafts on the passage to India by the Cape. The fatal case of typhus fever occurred on board the "Countess Russell" within a fortnight from the date of the troops embarking, and there was every reason to suppose the disease was contracted prior to embarkation.

There was a large proportion of cases of venereal disease among the drafts on board the "Himalaya" from Gravesend to Madras, contracted previous to embarkation. Two deaths occurred on board this vessel, one from inflammation of the brain, and the other from epilepsy.

No epidemic disease broke out among any of the bodies of troops proceeding on foreign service.

II. Troops Returning from Foreign Service.

The numbers of effectives who are shown by the ship returns to have embarked from foreign stations for England amounted to 12,019, representing an average *annual* strength of 2,872 men. There occurred among them during the voyages home 1,281 cases of sickness and 33 deaths, being in the annual

Troops on Board Ship.

ratio of 446 and 11·39 per 1,000 of strength. The diseases by which the sickness and mortality were caused are detailed in Abstract No. 31 in Appendix, from which the following classified Summary has been framed:—

Stations	From Mediterranean, British America, and West Indies.				From Cape, Mauritius, and Australasia.				From India, by the Cape.				From India, by Egypt.			
No. of men embarked ...	3,595				3,373				3,316				1,735			
Average *Annual* Strength	171				680				1,759				262			
Order.	Diseases.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000 Admitted.	Ratio per 1,000 Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
	Class I.																
1	Miasmatic Diseases ...	14	...	81·8	...	155	1	227·9	1·47	277	4	157·4	2·27	64	1	244·2	3·82
2	Enthetic ,, ...	33	...	193·0	...	39	...	57·3	...	146	...	83·0	...	11	...	42·0	...
3	Dietic ... ,, ...	1	...	5·9	...	4	1	5·9	1·47	1	...	·6	...	1	...	3·8	...
4	Parasitic ,, ...	...	...	...	...	...	...	...	...	1	...	·6	...	...	...	...	...
	Class II.																
1	Diathetic Diseases ...	1	1	5·9	5·85	...	...	...	...	9	1	5·1	·57	1	...	3·8	...
2	Tubercular ,, ...	1	1	5·9	5·85	4	3	5·9	4·41	8	4	4·5	2·27	...	...	...	...
	Class III. Diseases of the—																
1	Nervous System ...	2	...	11·7	...	6	1	8·8	1·47	13	1	7·4	·57	5	...	19·1	...
2	Circulatory ,, ...	...	1	...	5·85	3	2	4·4	2·94	3	...	1·7	...	...	...	...	...
3	Respiratory ,, ...	3	...	17·5	...	47	1	69·1	1·47	32	1	18·2	·57	9	1	34·4	3·82
4	Digestive ,, ...	3	...	17·5	...	13	2	19·1	2·94	35	4	19·9	2·27	9	...	34·4	...
5	Urinary ,, ...	...	...	...	...	1	...	1·5	...	1	...	·6	...	...	...	...	...
6	Reproductive ,, ...	1	...	5·9	...	4	...	5·9	...	4	...	2·3	...	1	...	3·8	...
7	Locomotive ,, ...	...	...	...	...	...	...	...	...	6	...	3·4	...	1	...	3·8	...
8	Integumentary,, ...	9	...	52·6	...	40	...	58·8	..	103	...	58·6	..	11	...	42·0	...
	Class IV. Diseases of Nutrition	3	...	17·5	...	4	1	5·9	1·47	8	...	4·5	...	...	...	...	...
	Class V.																
1	Accidents	9	...	52·6	...	37	...	54·4	...	77	...	43·8	...	5	...	19·1	...
4	Suicide	...	...	...	...	...	1	...	1·47	...	...	...	...	...	...	...	...
	Diseases not Specified	...	...	...	...	1	...	1·5	...	1	...	·6	...	...	...	...	...
	Total	80	3	467·8	17·55	358	13	526·4	19·11	725	15	412·2	8·52	118	2	450·4	7·64

The proportion of cases of sickness has not been high in any of the groups. The excess of enthetic diseases in the first group occurred in the 1st Battalion 25th Regiment, which embarked at Quebec. There was no epidemic on board any of the ships.

The mortality was high in the second group, chiefly from the deaths of seven men on the passage from the Mauritius, 2 by consumption, 2 by inflammation of the liver, 1 by dysentery, 1 by atrophy, and 1 suicide by drowning. It is probable that the high rate of mortality was one of the ultimate results of the fever which prevailed to such an extent as an epidemic in the island.

It is worthy of remark that no deaths from spasmodic cholera occurred among the troops returning home from India. Only two deaths occurred among that portion of the force which returned *vid* Egypt, one from inflammation of the lungs, and the other from chronic dysentery.

III. Troops proceeding from one Colony or Station to another.

Troops on Board Ship.

The number of men who appear in the ship returns as having embarked to proceed from one colony or station to another, amounted during the year to 10,952, and represents an average *annual* strength of 866. The cases of sickness which occurred among them were 474, and the deaths 18, being in the ratio of 547 and 20·78 per 1,000 of the mean annual strength. The diseases by which the sickness and mortality were caused, are stated in Abstract No. 32 in Appendix, of which the following is a classified Summary:—

Order.	Diseases.	Between Mediterranean, British America, and West Indies, and between Gibraltar and Mauritius.				Between India, Abyssinia, Cape of Good Hope, Mauritius, Ceylon, China, and Japan.				Australasia.			
	Number of Men Embarked	6,040				4,353				559			
	Average *Annual* Strength	468				325				73			
		Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
	Class I.												
1	Miasmatic Diseases	60	3	128·2	6·41	102	3	313·8	9·23	5	..	68·5	..
2	Enthetic „	31	..	66·2	..	58	..	178·5	..	1	..	13·7	..
3	Dietic „	..	..	..	..	3	..	9·2	..	..	..	..	..
4	Parasitic „	..	..	..	..	..	..	..	..	..	..	..	..
	Class II.												
1	Diathetic Diseases	1	..	2·1	..	..	..	..	..	..	..	..	..
2	Tubercular „	6	..	12·8	..	..	..	..	..	1	..	13·7	..
	Class III. Diseases of the—												
1	Nervous System	7	2	15·0	4·27	13	3	40·0	9·23	..	..	..	..
2	Circulatory „	..	..	..	..	..	..	..	..	..	..	..	..
3	Respiratory „	18	1	38·5	2·14	14	..	43·1	..	1	..	13·7	..
4	Digestive „	23	2	49·1	4·27	10	1	30·8	3·08	1	..	13·7	..
5	Urinary „	..	..	..	..	..	..	..	..	..	..	..	..
6	Reproductive „	3	..	6·4	..	2	..	6·1	..	..	..	..	..
7	Locomotive „	..	..	..	..	..	..	..	..	..	..	..	..
8	Integumentary „	30	..	64·1	..	24	..	73·8	..	1	..	13·7	..
	Class IV.												
4	Diseases of Nutrition	4	..	8·6	..	9	..	27·7	..	..	..	..	..
	Class V.												
1	Accidents	21	..	44·9	..	22	..	67·7	..	2	..	27·4	..
4	Suicide	..	3	..	6·41	..	..	..	..	..	..	..	..
6	Corporal Punishment	..	..	..	..	1	..	3·1	..	..	..	..	..
	Total	204	11	435·9	23·50	258	7	793·8	21·54	12	..	164·4	..

The admissions by miamastic diseases were rather numerous in the second group comprised in this Table, chiefly from the occurrence of cases of intermittent fever in the 33rd Regiment on passage from Kurrachee to Abyssinia,

Troops on Board Ship.

and of remittent fever in two companies of Royal Engineers proceeding from the Mauritius to the Cape. None of them terminated fatally. Three of the deaths in it were from spasmodic cholera among some men of the 3rd Battalion 60th Regiment, proceeding from Calcutta to Madras.

The three deaths by miasmatic diseases in the first group, occurred in the 1st Battalion 60th Regiment on the passage from Malta to Canada; one of them by spasmodic cholera, and two by choleraic diarrhœa. The regiment embarked at Malta after these diseases had been prevalent for some time among the civil population, and one fatal case had occurred among the women of the regiment six days before embarkation. During the voyage there were one case of cholera and 14 cases of diarrhœa among the men. The fatal case of cholera occurred two days after embarkation, and on the same day a child 5½ years of age was attacked, and died after nine hours' illness. Fifteen days after the Himalaya had left Malta, a fatal case of cholera occurred among the ship's company, and diarrhœa is stated to have been prevalent among them.

The deaths in the first group were also greatly increased by the effects of intemperance, two men having died by *delirium tremens* on the passage from America to the Mediterranean, and three having committed suicide by jumping overboard; all five were men of the Royal Artillery.

IV. Invalids, &c., Returning to England.

The ship returns account for 4,392 men, representing an average annual strength of 1,113, embarked chiefly as invalids, but including also a few "time expired" men. There were 1,851 of the men embarked as sick, 757 were taken into hospital during the passage to England, and 71 died. The deaths have been already included in the mortality of the different Commands from which the men were invalided.

XV.—SUMMARY.

Summary.

The following Tables show the principal results relative to the health of the Army at home and abroad in 1867, and the average of the seven preceding years:—

SUMMARY, showing the Amount of Sickness, Mortality, and Invaliding, and the Average Number of Men constantly Non-effective from Sickness in the Army at Home and Abroad, during the year 1867.

WHITE TROOPS.	Mean Strength.	Admissions into Hospital.	Deaths.	Men sent to England as Invalids.	Discharged the Service as Invalids.	Average constantly Sick.	Annual Ratio per 1,000 of Strength.				
							Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly Non-effective from Sickness.
United Kingdom	73,420	63,904	690	..	1,629	3,118	870	9·40	..	22·2	42·47
Gibraltar and Malta	9,474	7,481	154	221	137	389	790	16·26	23·3	14·5	41·07
British America	14,907	9,989	131	212	181	468	670	8·79	14·2	12·1	31·39
Bermudas	1,249	923	22	24	18	45	739	17·61	19·2	14·4	36·03
West Indies	1,619	1,829	66	54	23	81	1,130	40·77	33·3	14·2	50·03
Cape and St. Helena..	4,636	5,513	51	132	79	270	1,189	11·00	28·5	17·0	58·24
Mauritius	1,294	2,889	53	140	20	124	2,234	40·95	108·2	15·5	95·83
Ceylon..	919	1,000	13	24	16	47	1,088	14·15	26·1	17·4	51·14
Australasia	3,489	2,266	21	49	29	120	649	6·02	14·1	8·3	34·39
China and Japan	1,496	2,165	21	46	24	124	1,447	14·03	30·7	16·0	80·21
India	56,896	78,434	1,642	2,746	1,145	3,268	1,379	28·86	48·3	20·1	57·44
On board Ship*	6,353	3,526	56	..	..	..	555	8·81	..	..	..
Total	175,752	179,961	2,914	3,648	3,301	8,054	1,023	16·58	†35·7	18·9	45·82
COLONIAL CORPS.‡											
Malta	595	374	3	..	..	..	629	5·04	..	..	..
West Indies	2,080	2,373	61	..	69	137	1,141	29·33	..	22·29	65·87
Western Africa	1,015	1,425	46	..		52	1,404	45·32	..		51·23
Ceylon..	974	898	11	..	25	33	922	11·80	..	25·67	33·88
China	425	651	26	..	..	32	1,532	61·17	..	..	75·29
Total	5,089	5,721	147	..	..	..	1,124	28·89	..	..	..

* The deaths of invalids on their passage home are not included under this head, but among the deaths of the stations from which they were invalided.
† This ratio is calculated on the strength of the troops serving abroad.
‡ The Cape Mounted Riflemen and Royal Canadian Rifle Regiment are included in the first division of this Table.

Summary. SUMMARY showing the Sickness, Mortality, and Invaliding, and the proportion constantly Non-effective from Sickness per 1,000 of Mean Strength in the Army at Home and Abroad during the seven Years 1860-6.

	Annual Ratio per 1,000 of Strength.				
WHITE TROOPS.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly Non-effective from Sickness.
United Kingdom	976	9·33	..	37·8	50·07
Gibraltar and Malta.. ..	811	10·71	22·5	17·0	42·69
British America	645	9·18	15·8	12·6	29·94
Bermudas	744	35·58	19·9	12·4	41·68
West Indies	1,136	14·43	26·6	16·4	45·18
St. Helena and Cape ..	907	10·57	28·3	19·6	47·89
Mauritius	774	18·44	37·0	16·8	37·18
Ceylon	1,504	24·53	57·6	24·2	72·32
Australasia	601	16·93	20·9	18·1	34·43
China and Japan	2,004	57·75	59·7	22·1	76·87
India	1,651	27·48	37·4	17·6	64·69
On board Ship	749	15·34	..	..	..
Total	1,166	17·04	31·2	24·4	51·86
COLONIAL CORPS.					
Malta	840	6·98	..	..	..
West Indies	1,020	23·59	..	16·9	48·39
Western Africa	1,288	38·60	..		50·82
Ceylon	1,123	15·24	..	13·7	35·35
China	1,603	27·02	18·71	..	49·73
On board Ship	1,298	16·09	..	..	..
Total	1,211	24·14	..	..	..

Compared with the results for 1866 there has been an increase in the ratio of deaths to the extent of 2·28 per 1,000, and a decrease in the proportion of men discharged the Service as invalids, amounting to 4·8 per 1,000. There has also been a decrease in the mean daily sick of 2 per 1,000.

The rate of mortality, though higher than in 1866, was still a little under the average of the last seven years, and the numbers discharged as invalids and constantly non-effective from sickness were each 5 per 1,000 below that average.

APPENDIX.

APPENDIX No. I.

MEMORANDUM BY THE ARMY SANITARY COMMISSION ON PAPERS RELATING TO CHOLERA IN THE NORTH-WEST PROVINCES OF INDIA IN 1867; AND PROPOSED ENQUIRY INTO THE CAUSES OF CHOLERA GENERALLY IN THAT COUNTRY.

12th April, 1869.

After a laborious analysis of the papers,* and a careful consideration of the results, the Commission have arrived at the conclusion that the only lesson of practical importance conveyed by the papers is that it is most desirable a special enquiry into the whole subject of epidemic cholera in the East should be undertaken.

With this view we have, in communication with the Director-General of the Army Medical Department, prepared a code of instructions which includes the points necessary for ascertaining the laws of the disease, with the view of applying any knowledge so acquired to diminishing the fatality of cholera among the troops and civil population.

Some time since the Secretary of State gave authority for two young Medical Officers to proceed to Germany, with the view of making themselves acquainted with the latest enquiries in that country into the nature of cholera, and the microscopic character of organisms, to whose existence in the human body cholera had been attributed.

As this step would place two qualified observers at disposal for the more scientific portion of the work, it became necessary to lay down instructions not only regarding observation of the phenomena of the disease, but including all the scientific details calculated to throw light on the phenomena themselves.

The instructions which accompany this report contain the points on which the information is necessary, and any further questions requiring answer will, in all probability, present themselves while the results of the proposed investigation are in course of being obtained.

It may be necessary to explain that we take for granted a subdivision of labour. It is not our intention that every Officer engaging in the enquiry should devote his whole time to it, or that he should pursue it in all its branches. As a general rule, it will tend most to elucidation of the subject that each Officer (except such as may be detached for special enquiries) should devote his attention to the careful acquisition of facts within the sphere of his ordinary duties.

The instructions embody a uniform statistical method; a uniform meteorological record; observations to be made on the movement of cholera over the epidemic region, with the view of ascertaining, by a reduction of the facts, what are and what are not the laws of the movement of the disease.

While this portion of the enquiry is being carried out, we have provided instructions for conducting special comparative and differential local investigations in a few selected localities where cholera is endemic, and in others where it never appears, with the view of ascertaining the conditions which are favourable and unfavourable to the development and progress of cholera.

We have likewise provided as complete a code as possible for the special scientific enquiry to be conducted by the two officers already mentioned, who are now in India.

These investigations, together with chemical analysis incidental to them, will, it is hoped, solve many of the disputed practical points in the epidemiology of cholera, and enable measures of prevention to be taken against the disease, with better hope of success than heretofore.

* Despatches Nos. 156, 178, 201, 214, 239, 257, 288, and 304 of 1867, forwarded with letters from the India Office, dated 7th September, 1867, and 7th January and 14th February, 1868.

We beg to suggest that the instructions be laid before the Secretary of State for India, and, if his Grace should approve of the enquiry being carried out, that copies of the instructions be sent to the authorities in India for distribution to Army Medical Officers, through the Principal Medical Officers of British and Native Troops; to Sanitary Commissioners, Inspectors of Prisons, Civil Medical Officers, Officers of Health, and other persons who might aid in the enquiry.

We would further suggest that Army Medical Officers should report the results of each enquiry, through their respective chiefs, to the Government of India, who might be requested to send the reports home to the Secretary of State for India.

The Army Medical Officers of both services would keep the Statistical Register. They would make enquiries and record facts regarding the progress of epidemic cholera at stations occupied by troops.

They would make sanitary notes on local causes connected with stations, barracks, bazars, and their vicinity.

No doubt, many of these officers would take a personal interest in other questions regarding cholera stated in the instructions.

They might also render valuable aid in the special enquiries; but, bearing in mind the other duties these Officers have to perform, we do not deem it to be advisable to require them to undertake any investigations which might interfere with their proper functions.

As regards the local enquiries among groups of native population living in endemic and exempted localities, these are so special, and require so much aptitude for sanitary work, as well as time to devote to it, that the best way, perhaps, would be to select men in India for this object. We understand that there are several Medical Officers serving with British and native troops in India, who have shown more than ordinary ability for such investigations, and we would suggest that, on the recommendation of the Principal Medical Officers, such Officers should be temporarily detached for the duty. The reports of these Officers would be sent to their respective Principal Medical Officers, by whom they would be forwarded to the Government of India, for transmission to the India Office, in the manner proposed above.

As already stated, the special microscopic and scientific enquiries have been already entrusted to two trained Medical Officers. One of these, Dr. Lewis, is in Her Majesty's British Service; the other, Dr. Cunningham, is in Her Majesty's Indian Service. We would propose that both Officers should report to the Government of India, through their respective Medical Chiefs, for transmission to the India Office as already stated.

A most important part of the enquiry would have to be conducted by Medical and other Officers belonging to the Indian Civil Service.

This would include the statistics of cholera, and other enquiries among the native population.

Cholera in prisons.

The question of pilgrimages, and the movement of cholera in relation to the move of population.

Records of cholera among emigrants, &c.

All reports of this class would be forwarded, through the customary channels to the Secretary of State for India.

It would be impossible for us to indicate the details of an organization for these objects. These must necessarily be left to the authorities in India.

J. HOPE GRANT, *Quartermaster-General, President.*
DOUGLAS GALTON.
JOHN SUTHERLAND.
H. H. MASSY.
T. A. L. MURRAY.
W. E. BAKER.
J. R. MARTIN.
ROBERT RAWLINSON.

J. J. Frederick, Secretary,
Army Sanitary Commission,
War Office, 12th April, 1869.

INSTRUCTIONS FOR CONDUCTING AN ENQUIRY INTO CHOLERA IN INDIA.

(Prepared by the Army Sanitary Commission.)

CHOLERA first appeared in an epidemic form in India, and it is to Medical Officers who had served there, that we owe the earliest investigations into its nature and treatment. For many years nearly all that was known of the disease was contributed by these officers. and only at a comparatively recent date have investigations in Europe been more than extensions of enquiries previously begun in the East.

Lately, however, the whole subject of epidemic cholera has obtained a new development from scientific investigations carried out in Europe; while the great losses recently sustained by troops serving in India have shown how little has been accomplished towards diminishing its fatality.

Under these circumstances it has been considered desirable that a special enquiry, in conformity with the following instructions, should be undertaken, with the view of ascertaining whether with improved methods of research any further information can be obtained regarding this disease.

An investigation, such as the one contemplated, is beset with difficulty, and trustworthy results can only be arrived at slowly; but the final object is so important to the public interests as to afford sufficient justification for undertaking the work.

§. I. OBJECT OF THE ENQUIRY.

The object of this enquiry is to ascertain by an investigation, as complete as our present means may enable us to carry out, what cholera is? What are its laws of origin and extension? What is the real nature of the pathological changes which occur in persons suffering from it? What are the best methods of treating the disease, and by what proceedings the ravages of cholera may be mitigated, or its progress arrested?

The enquiry is a purely practical one, and as it may lead to legislative measures involving interference with freedom of intercourse, and to a large expenditure of public money, as well as to considerable private sacrifices, no results can be accepted for practical use unless these are fully sustained by obvious facts.

The enquiry is not to be undertaken with the view of establishing any particular doctrine or hypothesis in regard to cholera, neither is it to be carried out from any central doctrine or hypothesis, round which the facts are expected to range themselves.

If any beneficial result is to follow from it, the enquiry must be pursued without prepossession, and with the single object of ascertaining what is true.

It is necessary to give this caution, on account of a natural tendency which has shown itself in dealing with a subject of such difficulty, to trace the manifold phenomena of epidemic cholera to some single cause,—such as epidemic influence, water contagion, cholera excreta, unhealthy subsoil, cholera germs, and the like; and to build on single causes, or on hypothetical considerations, not only epidemic doctrines and pathological systems, but also methods of treatment and measures for arresting the ravages of the disease, at the risk of overlooking the real evils to be dealt with, and of inflicting suffering and loss by the execution of measures not adapted to the ends they are intended to serve.

No opinion or hypothesis, and no evidence, except such as is sufficient to prove the existence of uniformly operating causes of disease, can ever justify legislative action in public health questions, or the expenditure of public funds.

The enquiry will probably not be completed when the present instructions are exhausted. These instructions are directed solely to ascertain facts, which

when arrived at may indicate other points requiring examination. It is hoped that by following rigidly and experimentally this course of proceeding, the time may arrive when all the phenomena of cholera may arrange themselves naturally under some general expression indicating the measures required for saving human life, and when the various and apparently contradictory phenomena of the disease may become self-interpreting.

It is not, of course, intended that all Medical or other Officers should undertake every detail in the following instructions. This course would be unadvisable, even if it were practicable. Medical Officers will, no doubt, at once perceive the points in which they can render efficient aid, and it is scarcely necessary to state that any Officer who can communicate even a few carefully observed facts in his locality will do more to advance knowledge than if he were to transmit conclusions or opinions founded on imperfect observations made over a large area of country.

It is proposed to arrange the enquiry as follows:—

First. To obtain statistics of cholera as accurately as possible.

Those for the troops to be entered in detail by regimental surgeons at every station, whether for British or native troops.

Those for prisons and other public establishments by medical officers attached to them.

Those for the civil population by the most efficient statistical machinery available.

All Principal Medical Officers should be kept informed as to the statistics of cholera and other epidemic diseases among the civil population of towns, villages, bazars, &c., in order that they may know the movement of epidemic diseases in their districts. And all facts of this nature are to be carefully registered by the Principal Medical Officer for transmission with his reports.

Medical officers of prisons and of other public establishments should be kept similarly informed.

Second. It is proposed that facts regarding the movement of cholera and the sanitary condition of troops and stations where there are British and native troops shall be given to the Principal Medical Officer of the station.

That similar facts regarding prisons and other public establishments shall be given by the Medical Officers attached to them.

That for cities, towns, and villages where enquiries of a special character are carried out, the sanitary reports should be drawn up by Officers of Health, or other Medical Officers selected for the duty, aided by Engineers or other persons having special knowledge, where necessary.

Meteorological observations should be supplied by existing observatories, and by the Officers at stations in charge of meteorological instruments.

Third. Special microscopic physiological and chemical enquiries into the nature and cause of cholera to be conducted.

(*a*) In localities where cholera is endemic,

(*b*) In localities always exempt from cholera,

By officers specially set apart for these enquiries.

Two Medical Officers specially trained for such investigations have already been sent to India.

Chemical analyses should be conducted by practised chemists.

Fourth. Although for the sake of uniformity and comparison it is deemed advisable, that special local enquiries should be undertaken by qualified observers, Medical Officers at stations, prisons, &c., are invited to undertake independent inquiries of this class to the extent of the means at their disposal. But it is not intended that they should feel themselves called on to do so if they have not the time or means.

Fifth. The special enquiries should be carried out in concert with existing sanitary authorities in India, under arrangements made on the spot, and all reports should be sent through the customary channels to the Government of India for transmission to the India Office.

§. II. Statistics of Cholera and Diarrhœa.

Little that is reliable regarding epidemic diseases can be ascertained without accurate statistical information.

There is no difficulty in obtaining information on this subject among British troops serving in India; but British troops constitute only a small part of the population attacked by cholera. Epidemics seize on all classes of population, and no trustworthy information can be obtained regarding the movement of epidemic cholera, except by including all classes in the same general statistical inquiry.

Much valuable statistical information regarding cholera has been already collected by Medical and other Officers in India, which will be reduced and made use of in due time. But as the present enquiry has a definite object, it has been considered desirable that it should be undertaken as far as practicable on one uniform plan, as follows:—

Cholera chart for troops, &c.

The accompanying Statistical Chart or Register contains the data required for British troops.* A similar Chart or Register would answer for women and children.

We would strongly recommend that the same Register, so far as it may be applicable, should be employed for native troops.

It would also be applicable, with a slight alteration, to the population of prisons and other establishments where numbers of people live together.

The data on this Register, when reduced, will give most of the information required about the disease itself.

Civil statistics of cholera.

Any statistical enquiry among the civil population would have to be conducted on different principles, because it would be impossible to obtain all the points of comparison which might be attainable among distinct bodies of men under discipline. It would be necessary, therefore, to restrict the enquiry among the civil population to general facts showing the course of epidemics. But this general procedure would nor interfere with special local statistical enquiries into cholera among the civil population where it was found to be possible to carry out any such enquiries.

We would venture to propose the following statistical points for registration by the civil authorities in all parts of India affected by cholera, where it might be practicable to obtain the information.

In all statistical enquiries regarding cholera and other epidemic diseases, the dates and localities of events are of primary importance.

1. The date of any evident increase of any class of fevers, stating the nature of the diseases and mortality generally.

2. The date of any evident increase of bowel diseases (diarrhœa and dysentery), stating the disease and mortality generally.

3. Should diarrhœa or dysentery break out suddenly, so as to present evidence of endemic attacks, the facts might be entered, wherever practicable, more in detail, as follows:—

(*a*.) Date of first endemic case.

(*b*.) Daily attacks and deaths. (This would include simply dates and numbers.)

4. A daily return of cholera attacks and deaths, wherever practicable.

A most important point in this record is the date of the first attack of cholera and of the first death. Both should be traced carefully.

A daily return should be prepared after the date of the first attack, unless it be impracticable to obtain the information.

If the disease has appeared among a group of population, an estimate of the population should be entered on the return.

When a census has been taken, more numerous and accurate data would be available; such as—

The numbers and sexes alive at each age.

The daily number of attacks for each sex and each age.

The daily number of deaths for each sex and each age.

If it be impossible to obtain a daily record of cases and deaths, the return might be limited to the following points:—

* Registers of different sizes for different strengths of Corps will be distributed together with these instructions.

a. Estimated population.
b. Date of first cholera case and of first death.
c. Date of last cholera case and of last death.
d. Total cholera cases and total deaths from cholera between these dates.

Statistics of station bazars. In bazars and native towns near stations of British troops, special arrangements might perhaps be practicable for obtaining daily statistical data regarding cholera and diarrhœa as accurately as possible, and also for recording all endemic outbreaks of fever, diarrhœa, or dysentery among their population.

In these circumscribed populations, a special census might be made, and the data proposed above, as to daily attacks and deaths from cholera for each sex and age, might be obtained.

The occurrence of cholera in the native population near British troops should be accurately registered, to admit of comparison with the course of the disease among the troops.

Cholera maps. The dates of attack, and the localities, when transferred to station, town, or bazar plans, and to maps for the whole country, will afford information as to the laws of progress of cholera, such as can be obtained in no other way.

§. III. Meteorology.

If meteorological observations are accurately kept, according to the instructions, at stations which have been provided with instruments, a comparison of the data over a series of years, including epidemic years, will afford all the required information in this department of the subject.

In comparing the meteorological elements of epidemic and non-epidemic years, for reports, the elements of most importance are—

Barometric pressure above the average.

Unusual droughts, leading to diminution and contamination of the water supply.

Unusual rainfalls leading to development of local malaria, or other local causes of disease; or unexpected rainfalls resulting in wearing of wet clothing.

Rapid changes of temperature, especially at unaccustomed times, leading to diminished or checked cutaneous action.

Unusually high temperatures combined with rainfalls.

Direction and strength of winds. It has been stated that winds coming from particular points have been accompanied by increase of cholera attacks, or that cholera has progressed in the direction, or against the direction of prevailing winds. All these points should be carefully noted.

Stillness of atmosphere, indicating stagnation in cities, villages, or dwelling houses, as well as diminution of oxygenating power of the air.

Amount of ozone. Prevalence, or otherwise, of fogs. Excess or diminution of hygrometric state of the air. Peculiarities in electric condition of the air.

Unusual atmospheric phenomena preceding the appearance or disappearance of cholera should be noted.

§. IV. Movement of Cholera.

Laws which determine the movement of cholera must be ascertained partly by careful observation of the phenomena of the disease itself, partly by scientific enquiry, the chief points of which are given in a subsequent section (§. VI).

Observations on the movement of cholera must necessarily be conducted by observers in numerous localities before the law of movement can be arrived at. But the scientific facts can be ascertained at a few selected stations.

It is proposed at present to enumerate the points in regard to which systematic observations on the movement of cholera are necessary among British and native troops, as well as among the population generally.

These are included in the following paragraphs:—

Premonitions of cholera. 1. When cholera is approaching a district, are there any indications of an altered state of health among the unaffected inhabitants, such as disturbance

of the digestive organs, altered expression of countenance, or of colour of the conjunctivæ and other mucous membranes; or of the skin, in Europeans and light-skinned native races?

2. Are diarrhœal or dysenteric affections, or fevers, more than usually prevalent?

3. Are there any other premonitions of cholera observable?

Positive or negative replies on these points should be given.

Enquiry regarding the forms of cholera.

Cholera presents itself under three states or forms:—

1. The sporadic form.
2. The endemic form.
3. The epidemic form.

In regard to these three forms of the disease the following questions suggest themselves.

4. Are they precisely similar, or in what respects do they differ in their observed characters?

5. Do premonitory symptoms prevail among unaffected persons in localities where each of the three forms occur.

6. Are there any appreciable phenomena in the disease, in the locality, in the habits of the people, or in the nature of the seasons and atmospheric conditions, which would obviously account for the existence of one form rather than another, or for the passage of one form into another?

7. Are there any facts to show why a sporadic case of cholera is not followed by other cases? Or,

8. Why an endemic outbreak does not become epidemic?

Question of susceptibility.

During endemic outbreaks, as well as during epidemics of cholera, it is usually observed that of the population exposed apparently to precisely similar conditions, a portion only suffer from the developed form of the disease, while the majority usually escape, or suffer from comparatively trivial symptoms.

It has hence been the custom to divide a population exposed to the same causes of disease into two classes: "susceptible," those who have suffered; and "non-susceptible," those who have escaped. But it is obvious that such a division affords no explanation of the occurrence. It merely repeats in other words the obvious fact that some have suffered while others have escaped.

It is proposed that an attempt should be made towards an explanation of differences in susceptibility by obtaining replies to the following questions. But any other points calculated to throw light on the question of susceptibility should be stated.

Influence of sex and age.

9. Of persons living in a circumscribed endemic locality, the numbers of whom at each age and of each sex have been ascertained by census, what percentage of each sex and each age living is usually attacked by cholera?

Influence of temperament.

10. Does cholera take place equally in all temperaments, or do certain temperaments suffer more than others?

Influence of diet.

11. Is there any observed difference in the percentages of attacks among persons who live altogether on vegetable diet, as compared with the percentages among persons who live on mixed diet?

Influence of health and habit of body.

12. Has the occurrence of cholera among a population any marked relation to a state of general health or habit of body among those who suffer which does not exist amongst those who escape?

Influence of race.

13. Is there any appreciable difference in the liability to attacks, or in the proportionate mortality from cholera among different races in India?

Influence of occupation.

14. Are any trades or occupations observed to be more conducive to attacks of cholera than others?

15. Can it be shown by statistics whether mehters employed in collecting and removing excreta during times when cholera prevails suffer more from cholera, or only to the same extent as others living in similar localities?

16. Are occupations involving much fatigue or long marches and the like more or less conducive to cholera?

Influence of intemperance.

17. Has the use of spirituous liquors any apparent influence on susceptibility to cholera.

18. Have regular temperate habits of life any apparent influence on susceptibility to cholera?

Influence of the element of number.

19. Can the exact influence of aggregation of persons, both as regards—
(*a*) Actual numbers,
(*b*) Crowding on a given area,
on susceptibility to cholera be proved statistically.

Communicability of cholera.

20. The fact, whether or not cholera is communicable directly or indirectly from person to person, should be positively ascertained.

Sources of evidence.

21. Evidence, either positive or negative, on this most important subject, may be derived from two sources, experiment and observation.

Experimental evidence.

22. The class of experiments most likely to prove or disprove communicability are stated under the special local enquiry (§. VI). It is proposed here simply to point out the kind of observations on the movement of cholera which would afford corresponding data.

Evidence from observations of sporadic cholera.

23. If a solitary indigenous case of sporadic cholera presents itself, the following questions will arise:—
(*a.*) What was the origin of the case?
(*b.*) Is there or is there not evidence to show that infection was imported from some distant place where cholera prevailed?
(*c.*) If there is evidence of importation, every step in the proof should be very carefully investigated and given in detail.
(*d.*) If the case had no communication with any other case, this fact should be stated.
(*e.*) The results, whatever they may be, of *every enquiry* made into the foreign origin of sporadic cases should be recorded.
(*f.*) Were there any local, personal, or atmospheric conditions to which the occurrence of the sporadic case might be reasonably attributed?
(*g.*) Was the communication which existed between the sporadic case and other inmates of the house, or between these inmates and those in other houses, followed by any appreciable effect on health.

Evidence from observations of endemic cholera.

24. When an endemic outbreak of cholera takes place, similar questions would arise, as follow:—
(*a.*) Was there any communication between the seat of the outbreak and any other locality where cholera previously prevailed?
(*b.*) If so, the dates and other evidence should be carefully given, and the precise nature of the communication should be described.
(*c.*) Could the progress of the endemic attack be distinctly traced to communication between the first or earlier endemic cases in the same locality and persons subsequently attacked? If so, state in detail the nature of the communication with the dates.

25. To complete the evidence on the subject of communication it should be distinctly stated whether or not there was communication between affected and unaffected persons without extension of the disease.

Evidence from observation of cholera in prisons.

26. Prisons afford excellent opportunities of investigating questions regarding cholera, including development of the disease, its relation to personal communication, or to purely local causes, its relation to endemic outbreaks in districts where prisons are situated, and to any general epidemic movement of the disease.

27. By observations made in prisons and prison infirmaries, we might ascertain whether cholera is preceded by appreciable changes in the health of prisoners; whether the disease breaks out without visible communication of any kind with affected districts; the laws of its development and extension among prison populations. Instances in which it appeared in different parts of the prison, *without* communication with affected prisoners, should be noted. As also the number of instances in which it *did not* appear after communication between affected and unaffected prisoners. Care might be taken to prevent all communication, temporarily, between affected districts or parts of the prison and unaffected prisoners, with the view of ascertaining whether the disease could be kept out of the prison, or confined to that part of the prison first affected.

28. It may be necessary to state that, as in all similar enquiries, a large number of observations of this class are required before conclusions can be drawn from them.

Evidence from observations of epidemic cholera.

29. When cholera takes on the epidemic form, it will become necessary to investigate very carefully the relation of movements of the population to movements of cholera. With this view the following steps should be taken:—

(*a.*) A record of all groups of populations, cities, villages, and the like, in the region of the epidemic, should be made.

(*b.*) On this record, the localities successively attacked, from the first appearance of the epidemic onwards to its termination, with dates of attack and other particulars, should be entered.

(*c.*) The localities and dates of unusual outbreaks of other diseases of the epidemic class,—fevers, diarrhœa, dysentery,—if there have been any such, should be recorded.

30. These data are necessary, in order to show the exact number of groups of population which have suffered or escaped within the epidemic region, and also to show whether cholera was or was not present before the arrival of persons, pilgrims, and others from affected districts.

Means of communication to be described.

31. In describing the movements of population between affected and unaffected districts, the means of communication, whether by walking, carriage, steamers, boats, railways, together with the rate of travelling, should be stated.

Importance of observing the influence of railway communication during epidemics.

32. Where the exact places, dates, and times of arrival can be ascertained, as in the case of railways, very important facts can be obtained with little difficulty.

Nature of data.

33. The following data for lines of railway would go far to show what is really the relations between movement of population and movement of cholera. Similar data might be obtained for main lines of highway and steamboats:—

(*a.*) Names of stations and times of departure and arrival along the line of railway.

(*b.*) If practicable, the names of stations and dates at which passengers booked at the first affected locality were put down. The facts might possibly be ascertained from the railway tickets.

(*c.*) Names of stations and dates at which any passengers suffering from choleraic disease were left.

(*d.*) Name of station first attacked with cholera, and date of appearance of cholera there.

(*e.*) Dates of appearance of cholera in all attacked stations, and groups of population along the line.

Caution necessary in conducting these enquiries.

34. It is necessary, perhaps, to suggest a caution in carrying out enquiries into the relation between the movement of population and the movement of epidemic cholera, in order to avoid the disturbing influence of coincidences.

35. There are several known factors to be considered in all similar enquiries.

(*a.*) There is the obvious movement of the disease.

(*b.*) The obvious movement of the population.

(*c.*) The fact that cholera appears without apparent or known movement of the population between affected and unaffected districts.

(*d.*) The fact that cholera has appeared in unaffected districts after arrivals from affected localities; sometimes only in persons arriving; sometimes only in residents; sometimes among arrivals first, and residents afterwards; sometimes in residents first, and among arrivals afterwards.

(*e.*) The fact that arrivals take place from affected localities in unaffected localities without any appearance of cholera following on arrival.

Cholera appearing after intercourse.

36. It would evidently be impossible to ascertain the truth by simply assuming that the arrival in unaffected districts of persons from affected districts was the cause of cholera appearing in these unaffected districts.

No proof per se of importation.

37. It would be equally impossible to arrive at truth by noting only those instances in which disease followed on the fact of intercourse, without noting those instances in which intercourse was *not* followed by spread of disease.

Negative facts as well as positive facts to be noted.

38. In all statistical comparisons on this point, two facts are indispensable:—

Statistical data required.

(*a.*) An estimate of the number of localities or groups of population which had communication with the affected centre, together with an estimate of their population.

(*b.*) The number and population of localities in which cholera appeared after communication, together with the dates of both events.

But other evidence altogether required.

39. But the fact to be reasonably shown by other evidence altogether is that the movement of population was the cause of the movement of cholera in those cases in which dates and localities are well known, and where there can be no doubt that the date of the appearance of cholera was subsequent to the date of communication with affected districts.

Recapitulation of nature of proof.

40. It may be repeated that the arrival of persons from affected in unaffected districts, and the subsequent appearance of cholera there, or the accidental passage of pilgrims near places or persons subsequently attacked with cholera, are nothing more than facts, in regard to the relations of which with each other, rigid enquiry is to be made, and the evidence itself must not be an opinion simply; for, as already stated, no opinion would warrant the adoption of legislative measures and the expenditure of public money. The evidence must be sufficient to satisfy every reasonable demand.

There is no doubt that this part of the enquiry is beset with great difficulties, as well as by many sources of error; but at all events a minute detail of such evidence as it may be possible to obtain should be given, in the hope that eventually the truth may be arrived at by improved methods of enquiry.

Coincidences to be stated.

41. If there is no satisfactory evidence, except the coincidence, or if the alleged fact be exceptional, this should be distinctly stated.

Observations of cholera among troops on march.

Much important information regarding the movement of cholera may be obtained by renewed observations on the appearance and course of the disease in troops on the march.

42. Besides the usual enquiries into the sanitary condition of camping grounds, water supplies, &c., it would be useful to record the following points:—

(*a.*) The state of health of the place from which the troops started, and date of starting.
(*b.*) The strength.
(*c.*) The nature of the country and length of marches, and dates.
(*d.*) The number of marches.
(*e.*) The state of health of towns or villages through which troops passed, and dates of passing; daily state of weather.
(*f.*) Date of appearances of cholera (if any) in the corps.
(*g.*) Names of places through which troops passed after cholera appeared, indicating those attacked, if any.
(*h.*) Date of disappearance of cholera.
(*i.*) Daily cases and deaths to be entered on the register.

Among no class of population in India more than among troops could accurate enquiries be made into questions regarding the communication of cholera from man to man, from passing columns affected with cholera to unaffected villages, and *vice versâ*.

Movement of epidemics on lines of movement of population.

Epidemics of cholera have generally, but not always, travelled in a north-western direction in India. It has been assumed that the movement of population is in this direction, and that the two movements stand to each other in the relation of cause and effect. We have already suggested a caution on this subject. But there is another very important element requiring investigation,—namely, whether movements of population towards the north-west are not accompanied by corresponding movements in other directions; and if so, whether cholera does or does not follow the course of movement in these other directions.

43. In other words, it should be determined by observation whether, if the movement of population has been oscillatory, the movement of cholera has been in one direction only; or whether it has oscillated with the population.

44. Again, as there can be no epidemic without population, it is important to determine whether lines usually taken by epidemics of cholera are or are not the lines of maximum fixed population.

45. Instances should be carefully examined where communication has existed between affected districts and localities which have at other times been seats of cholera, without being followed by outbreaks of cholera in the unaffected districts.

46. In localities which have never suffered from cholera, it should be ascertained whether this immunity has existed, notwithstanding communication with affected districts.

Relation of "communicability" to epidemics.

The next question of importance is to ascertain what is the relation of communicability, if it exists, to the phenomena of endemic and epidemic cholera? The following points require careful examination before an answer to this question can be given.

47. Can it be shown by the conclusive evidence of facts that endemics and epidemics are made up solely of cases arising from well-ascertained communication of the disease, either directly or indirectly, from sick to healthy persons?

48. Are there facts to show conclusively that endemics and epidemics are due solely to communication of the disease, and to nothing else? If so, the facts should be very carefully detailed.

49. Is communicability, if it exists, only one of the elements of the movement of cholera? If so, what is its importance in comparison with that of other elements?

Relation of epidemics to great physical disturbances.

50. Are there facts to show that the phenomena of epidemics are coincident with great general causes, such as the following:—

(*a.*) General telluric disturbances affecting great areas of country, such as flooding of the country, dryness and cracking of the soil, excess of moisture in the subsoil, generally increased impurity of water-sources, unusual disengagement of malaria, and the like. Great droughts and famines.

(*b.*) A generally disturbed or contaminated state of the atmosphere, marked by unusual heats, colds, winds, calms, clouds, fogs, storms, rainfall.

(*c.*) General vital disturbances affecting animals as well as men, and probably also affecting vegetable life, such as unusual prevalence of febrile diseases, diarrhœas, dysenteries, influenzas, and the like. Epizootic diseases, blights in cereal crops, &c.

(*d.*) These phenomena existing not only in the epidemic region, but in distant parts of the earth (for instance, the epidemic cholera of 1867 in India co-existed with the great Mauritius epidemic of intermittent and remittent fever, and with epidemics of cholera and yellow fever among the West India Islands and round all the shores of the Gulf of Mexico).

Enquiry into causes why epidemics cease.

Enquiry should be made to ascertain why endemic or epidemic attacks of cholera come to an end.

51. If atmospheric conditions are causes of cholera, do the conditions undergo alteration when cholera declines and disappears?

52. If defective sanitary conditions are determining causes of outbreaks of cholera, why do they cease to act after a time?

53. If cholera is spread from person to person by contagion or cholera poison, how does it happen that the agent or poison communicated ceases to act after a time?

These questions require rigid scientific investigation; but light may be thrown on them by practical enquiries, such as the following:—

54. When cholera is in a district it might be observed to what extent the disease can be mitigated by better diet and regimen among troops and prisoners; and it might be further ascertained whether improvements in these particulars have been extending themselves among these classes of population during outbreaks of cholera for the express purpose of precaution,

55. It might be further ascertained whether, when the arrival of cholera is anticipated, the past known susceptibility of a well-marked endemic district can be diminished by sanitary measures, cleansing, improved water supply, and the like, to such an extent that it may escape the disease more or less: and further, whether in other cases the progress of sanitary improvements has been coincident with decline of the disease.

56. Questions regarding locality might be further elucidated, as follows:—

(*a.*) By observing and recording the effect produced on an epidemic or endemic attack among troops or prisoners by camping out on clean ground, as contrasted with the progress of cholera in barracks or prisons where this measure has not been adopted, or only partially adopted.

(*b.*) By removing small groups of population out of bad sanitary conditions from houses were cholera prevails, into healthy localities under good sanitary conditions, and by noting carefully the results to health.

State of public health after cholera.

57. After an endemic or epidemic attack of cholera has ceased in a well-marked locality, it would be important to examine into the general health of the people, and to compare it with the state of health before cholera appeared.

Observations of cholera on board ship.

58. An important class of facts might be obtained regarding outbreaks of cholera on board troop and emigrant ships by the following form of record:—

(*a.*) State of health of port and district from which troops or coolies have been embarked. Date of last cholera case. Date of departure of ship.

(*b.*) Sanitary state of ship and passengers at the time of departure, including questions of ventilation, crowding, quality of water, food, &c.

(*c.*) Whether cholera broke out on the passage, and if so, the dates, cases, deaths, state of weather, the then sanitary state of the ship, and other occurrences.

§. V. Sanitary Enquiries in Special Districts and Localities.

It is important that a special enquiry should be undertaken, not necessarily in all places affected with cholera, but in a few well-marked localities in different districts, including hill stations, with the view of determining what is the precise influence of bad local conditions on the origin and progress of cholera in India.

By whom to be undertaken.

This part of the enquiry should be carried out by principal Medical Officers for stations of British and Native Troops, and by Sanitary Inspectors, Officers of Health, or other selected Medical Officers for cities, towns, villages, bazars, prisons, and pilgrimages.

Nature of localities.

With this view it would be advisable to select places—

(*a.*) Where cholera never breaks out,

(*b.*) Where cholera is endemic,

(*c.*) Where cholera prevails epidemically,

And to obtain corresponding comparable data for each locality.

Comparative topographical details.

The topographical points specially calling for enquiry are:—

1. The approximate height of the station or locality above the sea level.

2. The approximate height or depression (if any) of the station or locality above or below the level of the surrounding country.

3. Whether the locality is near the sea, or near a river, or any large collection of water, or near damp nullahs, marshes, or marshy wet ground; and if so, at what distance, and in what direction the water or marshy ground lies, with reference to the locality and to the prevailing winds.

4. Also whether the level of the locality be above or below water level in the adjacent river or lake.

5. A general account should be given of the surface of the country around the station or locality—whether it is flat or undulating, or hilly, or mountainous; and what effect (if any) the general configuration of the district is likely to have on the movement of air currents, and generally on the ventilation of the locality.

6. Whether the country around the station or locality is open or encumbered with vegetation, together with the nature of the vegetation, trees, jungle, and the like.

7. Whether there are damp or wooded ravines in the vicinity themselves productive of malaria, or leading directly from malarial districts of country.

8. The geological structure of the district should be described, including under this head:—

The general nature of underlying rocks.

But especially the nature of soils and subsoils, and the depth of these as far as it may be practicable to give them.

Prevailing malarial diseases.

9. Enquiry should be made as to whether marsh fevers are frequent among the population, and their sources.

10. Also whether cases of cholera or diarrhœa are influenced by malaria, and whether cases of marsh fever have passed into a choleraic state or into cholera.

11. An important element in this enquiry is the extent and condition of agriculture in the vicinity of towns and villages, nature of produce, condition of general drainage of the country, and whether irrigation is in use, and how it is carried out. *State of agriculture.*

12. The state of river banks should also be examined, and it should be ascertained whether the subsoil of attacked as well as of exempted towns and villages situated on river banks is infiltrated by water from the river. The level of water surfaces of rivers, relatively to the level of surfaces of towns and villages, should be examined at periods when cholera prevails, and also at times when there is no cholera. *River banks and water level.*

13. Intimately connected with this part of the subject is the position of inhabited buildings with reference to higher ground close to them, such, for instance, as buildings being erected close to slopes or sections of earth, or of rock rising more or less above the level of the inhabited floors. The distance at which buildings are placed from these sources of malaria, and also the height of the section above the floor should be stated. *Position of inhabited buildings.*

14. Instances in which foundations of infected buildings are below the general level of the country, or below the level of water surfaces in rivers, should be carefully noted.

15. The next important point of the enquiry is into the subsoil drainage of stations, towns, and villages, subject to attacks of cholera, in comparison with the subsoil drainage of localities hitherto exempt from cholera. *State of subsoil drainag*

16. This enquiry involves the depth of the water-line below the surface in dry and wet weather, at times when cholera is present, and at times when there is no cholera; the slope of the ground in reference to facilities of outfall for subsoil drainage, the nature of subsoil; whether the buildings rest directly on rock; if so, its nature, especially whether it is porous or impervious to moisture.

17. It should be stated whether water lies on the surface of station, town, or village after rains, and if flooding from rains or rivers takes place; together with the nature of surface drainage works (if any) provided for carrying away flood and surface water.

18. An enquiry should also be made as to the probable amount of water carried for consumption into the station, town, or village. *Removal of foul water.*

19. It should be stated distinctly whether foul water from barracks, hospitals, houses, baths, kitchens, lavatories, and the like, is drained away to a distance, or carried away by labour, or allowed to run away on the surface until it sinks into the subsoil or evaporates. If there are surface drains the fact should be stated; whether water thrown into them flows readily away to a distance, or sinks into the subsoil through the bottom of the drain; and whether foul water remains stagnant in the drains; and whether the drains give rise to nuisance.

The nature of the surface should also be examined, to ascertain:—

20. Whether the surface in and around inhabited buildings in stations, towns, and villages, is equal and smooth, so as to allow of a free flow of rainfall. *State of surface drainage.*

21. All collections of stagnant surface water in tanks, jheels, holes, ditches, and the like, should be noted, together with their extent, the condition of the water in them, the uses to which the water is put, and whether any nuisance arises from such collections of water.

22. The state of cleanliness of the surface of stations, towns, and villages selected for these enquiries requires special attention. The vicinity of each should be examined to see whether there are any heaps of foul matter, or whether the people resort to the outskirts for the purposes of nature; also the extent to which this source of nuisance exists: whether it is increased by rains or by close damp warm weather. If there be nuisance from the practice, the extent to which it was experienced before or during the outbreak of cholera should be stated. *State of cleansing and nuisances.*

23. An important part of the enquiry is into the condition of courtyards of dwelling-houses; whether there are accumulations of foul matter in them, or if the surface is kept clean.

24. The state of cleanliness of streets, lanes, roads, gutters, and the like, should be reported on.

25. It should be specially stated in what manner the excreta from barracks, hospitals, and native dwellings are disposed of. How often the excreta are removed, the manner of removal, and whether there is much nuisance in the process; to what distance from inhabited buildings the excreta are removed; how they are disposed of; whether afterwards there is any nuisance from the accumulations, especially in wet or in damp warm weather.

26. In cases where outbreaks of cholera have been coincident with the existence of nuisance from any source enumerated above, the facts should be carefully examined and described.

Enquiry into the water supply.

27. A very careful enquiry should be made into the condition of water supply of these selected stations, towns, and villages, including the points regarding water supply stated in §. VI.

A copy of any chemical analysis made of water used for drinking and cooking by troops or civil population when cholera is present, should be appended to the Medical Officer's Report.

28. In cases where violent outbreaks of cholera have accompanied an impure state of the water supply, the facts, both as regards the disease and the source and quality of the water, should be carefully detailed.

General condition of dwellings.

Another important matter for observation is the general condition of barrack accommodation, and of houses of the native civil population liable to outbreaks of cholera.

Barrack-rooms.

29. As regards barrack-rooms, the most important statistical elements on which information is required are included in the cholera register.

It sometimes happens that at military stations, troops living in barracks suffer much more from cholera than officers living in quarters. Also, that troops quartered in certain barrack blocks, or in certain rooms, or even in particular parts of the same room, suffer more than others. These differential facts are of great importance in this enquiry. They should be carefully examined into, and the cause of the difference in susceptibility stated as far as practicable.

Native dwellings.

30. As regards native dwellings, the following points are of importance:—

(*a.*) To ascertain whether cholera was spread more or less equally over the area of the town or village, or whether it was chiefly confined to certain localities only; and if so to state any peculiarities in the sanitary condition of those affected districts or localities.

(*b.*) To give a very general account of affected native houses, including—

Construction and materials, usual dimensions, number of apartments, doors, windows, and the like.

Number of floors, and which floors are occupied for sleeping.

State of houses, courts, and compounds, as to cleanliness, keeping of animals, &c.

Nature, position, and state of privy accommodation, and arrangements for cleansing.

Position of private wells in relation to privies, and state of the water.

Number of inhabitants generally, and whether crowded or not. Condition of the air and ventilation of affected houses.

31. Any appearance of fungi or lichens on walls of affected houses should be examined under the microscope, drawn and described.

32. It would be important to ascertain whether newly-constructed native houses are less liable to attacks of cholera than old and long-inhabited houses among the same class of population.

Importance of differential enquiry.

33. Most important data might be obtained by selecting, say two stations, one notoriously subject to cholera, the other always exempt from cholera, by comparing all the elements presented by each, and by describing the differences.

Another important class of facts of the same kind might be obtained by selecting an endemic locality in which there are houses or portions always attacked, and others always exempt, and comparing the differences in the two classes of dwellings.

Evidence from improvements.

34. A notoriously unhealthy locality might be thoroughly improved, and the results to be dealt carefully given.

§. VI. Special Local Enquiry.

As already stated, this enquiry is intended to be conducted by specially appointed observers now in India, but all Medical Officers are invited to contribute observations as far as it may be in their power to do so.

To be carried out in specially selected localities.

The enquiry should be carried out in specially selected localities where cholera is endemic, or where it breaks out occasionally.

It should also be carried out in localities always exempt from cholera.

And at different seasons.

The enquiry should be pursued at different seasons in both classes of localities, and the season and atmospheric conditions should be stated under which any observations of interest have been made.

Subjects of enquiry.

The enquiry will include a microscopic examination of air, water, soils, articles of food, organs and tissues, vital fluids, including secretions and especially diarrhœal and cholera discharges.

Microscopic constants to be obtained.

The object which should be kept in view in the enquiry is to obtain what may be called microscopic *constants* for each selected locality *when cholera is absent*, in order that these observations may be compared with another set of microscopic *constants* obtained *during the prevalence of cholera* in the same localities.

The results of all observations, as well as all similarities and differences in observed results, obtained in localities with and without the presence of cholera, should be carefully described and accurately measured and drawn by camera.

If the observer has arrived at what he considers to be a satisfactory opinion as to the nature of the objects figured and measured by him, he should state fully the reasons which have led him to his conclusions.

1. *Microscopic Examination of the External Atmosphere.*

Examination of air.

1. Samples of air should be taken at four or five feet from the ground (the height to be stated). This class of observations should be made under different atmospheric conditions; and besides the date or dates, and hours, between which observations have been made, the following meteorological elements, when obtainable, should be recorded:—

Daily barometric height.
„ dry bulb temperature.
„ wet bulb „
„ maximum „
„ minimum „
„ winds, direction and force.
„ calms, &c., and whether wind blows over marshes, nuisances, and the like.
„ rain.

Methods employed.

2. For examining the air an aspirator of known cubic contents should be provided. An ordinary chemical gasometer, or an air-tight vessel, to be filled with water from a cistern, and emptied by a stop-cock from below, should be used. Various methods have been adopted for straining the air in its passage from the atmosphere to the aspirator, so as to retain foreign bodies contained in it. Cotton, or asbestos, placed in a glass tube through which the air is to pass, have been used. If this method of straining the air were employed great care would have to be taken to ensure that the material is perfectly clean, and it should be microscopically examined before being used.

For the purpose of immediate microscopic observations, aspired air is made to impinge on a glass plate moistened with glycerine, which retains any foreign bodies in the air.

Another method has been to draw the air through distilled water contained in Wolfe's bottles; care having been previously taken to cleanse the bottles and tubes perfectly, and to boil the distilled water immediately before use.

This method yields results more or less reliable, but it has been found

that foreign bodies, both organic and inorganic, pass through the water, and that only a part are retained.

A third method consists in drawing the air through a horizontally placed glass tube imbedded in a freezing mixture, so as to condense the moisture in the air; this condensed moisture being the vehicle for retaining any matters carried along by the air.

A modification of this plan is to expose a glass globe, containing a freezing mixture, to the atmosphere, and to collect and examine drops of moisture obtained in this way.

Objects to be attained.

3. It is desirable that any method adopted should combine two objects: 1st, to obtain the contents of the atmosphere for examination; 2nd, to estimate the amount of foreign bodies in the air in proportion to the volume of the air.

Precautions to be observed.

4. A very important precaution to follow is to complete the experiments as quickly as possible, so that the results may not be vitiated by the rapid development of organic life in the climate of India.

5. A few trials will soon determine which process is the best, and when this is done the process should be adhered to.

6. It would be important to carry out similar enquiries at times when fogs are prevalent, especially during night, and also with air taken over or close to marshes.

7. As already stated, these observations on air should be made in localities where cholera never appears, and also in cholera districts at times when cholera is present, and at times when it is absent.

Examination of rain-water.

8. It would be advisable to make careful microscopic examinations of newly-fallen rain-water from time to time, but more especially in districts and at times when cholera prevails, and any foreign bodies found in the rain should be carefully described and figured.

2. *Examination of Soils.*

Relation of soils to cholera.

The relation between the nature of soils and subsoils and cholera requires further elucidation.

For this purpose it would be desirable to select localities in which cholera is endemic, and localities in which it never appears, and to conduct comparative enquiries at each locality on the following points:—

1. The general character and depth of the surface soil and subsoil occupied by the population.

2. If the surface consists of rock, its nature and general character should be stated.

3. Arrangements should be made for continuous observations on the water-level in the subsoil; its depth below the surface, and its temperature, should be registered at fixed periods when cholera is present as well as when there is no cholera. The fact of the presence or absence of cholera at the times of observation should be noted.

4. The upper layer of subsoil-water should be examined chemically and microscopically at times when cholera is present or absent, and the results recorded.

5. The temperature of the soil at different depths, as well as at the surface, should be ascertained and registered at the time observations are being made on the water-level.

6. The night surface-soil temperature and its relation to fogs should be noted.

7. Average specimens of soil, or of rock, as the case may be, at and near the surface should be taken from similar places among the houses in endemic and exempt localities, and submitted to the following examinations.

8. The proportionate amount of air in the interstices of a given weight of earth or rock should be determined.

9. The nature and constituents of this air should be carefully ascertained, especially with reference to the presence of microscopic organisms, and organic matter, animal or vegetable.

10. The proportion of water held in combination with the soil or rock should be determined. Also,

11. The amount of water which the soil or rock can absorb.

12. The chemical constituents of the soil should be examined particularly as regards the amount of organic matter of animal origin in relation to the amount of ammonia, nitrites, nitrates, and chlorides.

3. *Microscopic Examination of Water.*

Water to be examined at sources of supply.

1. This, like other comparative branches of the enquiry, should include the microscopic condition of water used for drinking and cooking purposes, in localities subject to cholera, and also in localities which enjoy an exemption from cholera.

2. In cholera localities, the examination should be made at times when there is no cholera, and it should be carried on into times when cholera breaks out among the people. It should be continued during the whole period of the epidemic, and onwards until it has ceased. In this way a microscopic picture of the water supply of affected populations will be obtained.

3. In localities which have hitherto escaped cholera, a sufficient number of examinations should be made to enable the microscopic state of the water to be ascertained.

4. The points requiring notice and record are the following :—

(*a.*) The source of supply of drinking-water, well, tank, river, &c.

(*b.*) The position and distance of the source, with reference to dwelling-houses, or other causes of impurity.

(*c.*) The state of the surface and subsoil around the source, whether both are clean, or whether foul drainage or surface impurities are likely to find their way into the water.

(*d.*) Whether the people wash clothes, or wash or bathe themselves in the water, or near the mouth of the well.

(*e.*) The depth of the water level in the well, below the surface of the ground.

(*f.*) The sensible physical qualities of the water as to colour, taste, smell, and the like, and whether the water is alcaline or neutral.

Water from water-vessels to be examined.

5. Microscopic examinations should be made not only of specimens drawn from the sources of supply, but of samples of water taken from vessels in which it is kept for use by the people, or by troops.

Points for examination.

Microscopic examinations of water should include the following elements :—

(*a.*) An account, illustrated with camera drawings and micrometric measurements, of all organic and inorganic bodies found in the water.

(*b.*) A comparative determination of the amount of microscopic organic and inorganic bodies in a given volume of water.

This determination should be made on some general principle, such as the following, which has been used in this country.

Half a gallon of water should be allowed to remain at rest in a scrupulously clean glass vessel, excluded from light and air, for a few hours, and the sediment examined under the microscope.

(*c.*) If the quantity of sediment be very small, the lower portion of the water should be transferred into a clean conical glass vessel, and excluded from light and air for such time as may allow of the subsidence of deposit into the narrow portion of the vessel. The deposit should then be examined.

(*d.*) Precaution should be taken that no development of organic bodies takes place in the water while being treated in this way.

(*e.*) After a few trials a rough estimate may be formed as to the number or proportion of microscopic bodies found in the quantity of water submitted to examination.

6. An account should be given of the large non-microscopic forms of vegetable and animal life, if any, existing in the water source.

7. If the observer has arrived at an opinion as to the nature of the

organic bodies discovered by the microscope, he should state it, and give his reasons for arriving at his opinion, unless the objects are already well known.

8. It would be important to make microscopic observations on water drawn from marshes near districts attacked by cholera.

4. *Microscopic Examination of Articles of Food.*

1. This examination should include articles consumed by troops, and also articles of ordinary consumption among the civil population.

2. Like other branches of the enquiry it should be carried out both in localities where cholera is of frequent occurrence, and in localities not subject to outbreaks of cholera.

3. In cholera localities it should be followed up when cholera is present, and when cholera is absent.

Points for enquiry.

4. The following would probably be a convenient mode of conducting the enquiry:—

(*a.*) To make a list of the alimentary substances made use of by troops and by civil population.

(*b.*) To examine these as to their apparent sensible qualities, goodness, inferiority, badness.

(*c.*) Then to examine them under the microscope, to become familiar with their normal characteristics when of good quality, with the view of ready detection of any departure from this condition.

(*d.*) To describe the microscopic changes observed, new bodies discovered, fungi and the like: noting any increase or decrease in amount when cholera is present or absent.

(*e.*) Any peculiarities observed, or any microscopic plants or animals in any articles of food should be measured, described, and drawn by the camera.

5. The dates of all examinations of this kind should be carefully kept, to be collated, with the dates of appearance or disappearance of cholera, or other epidemic diseases.

Diseases of Plants.

6. Careful enquiry should be made as to diseases occurring among plants, especially among cereals and other plants used as food, during the presence of, or preceding, an outbreak of cholera. Samples should be microscopically examined, and the results stated.

5. *Microscopic Enquiry into the Pathology of Cholera.*

Tissues to be examined.

1. This branch of enquiry should include a careful examination of organs and tissues of persons who have died of cholera in comparison with the healthy condition of the same organs and tissues in persons who have died by accident or by diseases not of the epidemic class.

2. These examinations might be made in localities where cholera has not hitherto appeared, and also in localities where cholera breaks out, and in such localities examinations should be made both during the presence and absence of cholera; the dates being recorded.

Differences observed to be described.

3. The object is to ascertain whether the microscope can detect differences, and, if so, what differences in organs and tissues of persons who have died of cholera, or whether the presence of an epidemic in a given locality produces any change in organs and tissues appreciable to the microscope in persons who have not died of cholera, or who have died of non-epidemic diseases in districts where cholera was prevalent at the time.

4. All observed differences, and all bodies foreign to the natural state of organs and tissues, fungi, animalcules, and the like, should be carefully described, measured, and drawn by the camera.

Caution.

5. Care should be exercised in discriminating between organisms which were present during life, ard those which were manifestly developed after death.

Examination of fluids and excretions.

6. Another very important branch of the pathological enquiry is the microscopic characters of fluids in persons living in cholera localities, and in persons suffering from cholera, as compared with the characters of the same

fluids in persons living in localities where there is no cholera at the time, or where cholera never appears.

7. The most important points of comparison will be afforded by the blood, the urine, and intestinal secretions.

8. The general physical characters of all fluids submitted to examination should be carefully described, with the view of determining whether they have special physical characters, and of examining into the real cause of any peculiarities they may present.

9. The observer should make himself acquainted with the normal healthy microscopic appearances presented by these fluids in non-cholera districts, and in cholera districts when there is no cholera present, and he will then be in a position to detect with ease any departure from normal appearances when cholera prevails.

Characters of choleraic discharges.

10. Special attention should be directed to the diarrhœal and choleraic discharges of cholera patients, and also to the diarrhœal discharges of patients not suffering from developed cholera.

Objects of enquiry.

11. The object of this enquiry is to ascertain whether, when cholera is present in a district, any organisms, animal or vegetable, can be detected by the microscope in the discharges, other than those organisms (if any) which may have been found in the secretions of persons living in districts never attacked by cholera, or in districts liable to, but not at the time attacked.

Constancy of results to be ascertained.

12. It is most important, in the event of any such organisms being discovered, to examine the discharges in a sufficient number of cases, and frequently in the same case, to show whether their appearance is constant or only exceptional and accidental.

Caution.

13. Care should be taken to examine the discharges microscopically at different periods of the disease, and immediately they are passed, and also the microscopic characters of articles of nutriment used by the patient, to guard against error from the foreign introduction of microscopic bodies, or their development in the secretion either before or after it has left the system.

Effects of putrefaction.

14. Discharges should also be examined microscopically in various stages of putrefaction, and the results described and drawn.

Healthy excreta to be compared.

15. For purposes of comparison similar microscopic examinations should be made of healthy excreta of native population in various stages of decomposition.

Organisms to be described differentially.

16. If any microscopic organisms are detected, of which it can be said that they are peculiar to, and constantly present, either in diarrhœa or cholera cases, they should be compared with any microscopic organisms discovered in the atmosphere, in water, or in articles of food and drink, and their similarities or differences described.

17. Attempts might also be made at cultivating any fungoid bodies discovered, with the view of employing the product in experiments on animals.

Caution.

18. Experiments of this class are necessary steps in solving a very important question—viz., whether these minute organisms are specific causes of disease, or whether their function is simply to convert noxious dead organic matter into innocuous living forms.

19. All microscopic organisms or other bodies discovered in discharges by the microscope should be described, measured, and drawn by camera.

6. *Microscopic and Physiological Enquiry as to the Cause of Cholera.*

1. The next step in the enquiry is to ascertain what is the precise nature of cholera poison, if such there be; and the agency through which it is conveyed from affected to unaffected persons and districts.

2. The nature of this poison can, perhaps, be best ascertained by enquiries conducted in hospitals set apart exclusively for the treatment of cholera cases, and the hospitals selected should be in open healthy situations, at some distance from affected localities.

Seat of cholera poison.

3. This poison, if such there be, must exist in matters proceeding from the patient; in his expired air, cutaneous exhalation, matters ejected from the stomach, the urine, or intestinal flux; and it is in these that the cholera poison must be sought for if it exists.

Physiological experiment necessary as well as microscopic observation.

4. The main dependence for discovering the poison must be placed on the microscope; but the result of microscopic observations would be inconclusive, unless there were some means of proving that microscopic objects actually reproduced the phenomena of cholera. Physiological observation and experiment must, therefore, accompany microscopic enquiry.

Investigations to be comparative.

5. Microscopic investigations should be comparative—*i.e.*, they should show that objects discovered in the excretions of persons suffering from cholera do not exist in the excreta of healthy persons, or in those of persons suffering from other diseases. Again, the excretions of patients suffering from various classes of diarrhœa and from dysentery should be examined in order to ascertain whether any objects which may be discovered in them are similar to, or differ from, those discovered in the excretions of cholera patients.

6. The condensed moisture of the breath of cholera patients should be compared microscopically with the same object obtained from healthy persons, and with the same object obtained from persons suffering from diarrhœa.

7. The microscopic characters presented by condensed cutaneous transpiration in each class of persons should also be examined.

Examinations to be repeatedly made.

8. These examinations should be repeated a number of times in the same case, and also in a sufficient number of cases to ascertain whether the facts observed are constant; and if they are not, this should be distinctly stated.

It must be repeated that in this part of the enquiry two things are absolutely necessary for practical purposes.

(*a.*) That the facts should be ascertained.

(*b.*) That the constancy or otherwise of the facts should be determined.

Physiological enquiry on the poison of cholera.

9. A most important class of physiological data may be obtained from observing the movement of cholera in hospitals where the disease is under treatment, with reference to attacks among medical officers, attendants, and patients suffering from other diseases.

By observations in hospitals.

10. To avoid sources of error, hospitals selected for this enquiry should not themselves be situated in endemic localities, otherwise pure endemic cases, due to locality (if there be such), might be confounded with cases arising from communication (if there be such).

Statistical points for observation.

11. Suppose that the hospital is in a fairly healthy site, and that its sanitary condition is good, and the wards not crowded with sick, observations might be conducted as follows:—

(*a.*) The number of patients, with their diseases, should be recorded.

(*b.*) A record should also be kept of the number and duties of attendants in the hospital, and of the medical staff; and at the conclusion of the outbreak the number of cases of cholera, and of diarrhœa, which have taken place in medical officers, attendants, and patients should be recorded.

(*c.*) Differential observations might also be made on the proportion of attacks among attendants in good hospitals and in bad hospitals.

Nature of observations.

12. This part of the enquiry would include the amount and degree of communication existing between the attendant and the sick—his distance or proximity. The kind of communication, whether by inhaling the breath of the sick, or exhalations from excreta, by accidental wetting of the skin or clothing by matters ejected from the stomach or bowels, the accidental wearing of articles of clothing fouled in this manner, using foul bedding and the like, washing linen fouled by cholera excreta.

Both positive and negative results to be stated.

13. All instances should be carefully noted in which occurrences of this kind have taken place. The particulars should be recorded, and the instances in which disease *has not* subsequently appeared, as well as the cases in which it *has*, should be noted.

14. Careful enquiry should be made as to whether any part of the excreta were likely to have entered the system by abraded surfaces, by the lungs, or by the mouth.

By experiments on animals.

15. Another class of physiological experiments might be made with various species of animals in sufficient numbers to enable percentages to be deduced. Possibly mice, pigs, and monkeys would be the most likely animals available in India.

16. These experiments might be conducted so as to test not only the physiological effects of cholera poison, if such there be, but also to determine the vehicle or medium through which the poison reaches the system.

17. Animals might be confined in cholera wards under such conditions as would expose them only to poisons carried in the air from cholera patients, *e.g.*, they might be kept day and night in an undoubted cholera atmosphere, and the results, if any, noted at brief intervals.

18. Another set of experiments might be instituted in which animals are made to inhale an atmosphere containing emanations from cholera excreta, fresh or in advancing stages of decomposition.

19. In another similar set of experiments, emanations proceeding from clothes or linen saturated with fresh cholera evacuations of two kinds (vomiting and purging) might be tried.

20. And a similar set with saturated clothes in a dry state.

21. The experiments with excreta and clothes could be best made in a room at a distance from the cholera hospital. The room should be light, and of fair dimensions, and without sanitary defects, which might vitiate the results.

22. In this class of experiments some simple method could easily be adopted to ensure that the animals made use of are exposed only to matters diffused in the air. Such, for example, as confining them in the upper part of a box communicating with the lower part, in which is placed the material to be experimented with.

23. Animals might be made to drink water or to use articles of ordinary food containing various amounts of cholera excreta.

24. Another distinct class of experiments should be performed by giving *small* quantities of fresh cholera dejections by the mouth or rectum.

25. Also by injecting larger quantities in the subcutaneous tissue.

26. In these trials fresh and decomposing excreta should both be used.

27. And for the sake of comparison, cholera excreta disinfected with carbolic acid should be employed in other instances.

28. Animals might be made to drink moisture condensed from the air in the vicinity of sick, or drawn over cholera excreta.

29. But in conducting these experiments for practical ends, it should be kept in mind that there are two objects in view—first, to ascertain whether there is a specific cholera poison; second, to ascertain whether it is capable of producing choleraic symptoms in minute quantities, such as may be supposed to pass from person to person in ordinary human intercourse; and also to determine the probable channel of entrance of these minute quantities into the system. *Objects to be attained.*

30. Care should be taken that the excreta used in these experiments are not those of patients who have taken active medicines. *Caution.*

31. Should distinct specific effects be produced on animals, the following data should be recorded. *Data to be recorded.*

The dates.
Temperature and moisture of air.
The period after passing the excreta when the experiments were made, and condition of the excreta when used.
The number and species of animals submitted to experiment.
The number exhibiting specific symptoms.
A detail of the symptoms in each case.
The period after exposure when the symptoms showed themselves.
The duration of the symptoms.
The termination by death or recovery.
Some account of post-mortem appearances.
An account of any special microscopic objects discovered in the excreta or intestinal canal.

32. Care must be taken that the animals are not exposed to injury or to production of disease simply by the methods or manipulations employed, which would vitiate the results. *Animals not to be injured by processes.*

33. Healthy animals might be confined in the same place with animals which have been subjected to these experiments, and the results noted.

Experiments with non-choleraic discharges.

34. Any results from experiments on animals will be incomplete unless repeated with diarrhœal excreta not proceeding from cholera patients, and at times when cholera is absent.

Experiments with dysenteric excreta.

35. For the sake of comparison similar experiments should be made with dysenteric excreta.

Vehicle of the cholera poison.

36. Experiments to determine the vehicle of cholera poison, if such there be, may be made by examining the air in the immediate vicinity of the sick, by condensing the moisture, and submitting the result to microscopic examination in the manner elsewhere stated.

37. This examination should be made, together with a corresponding examination of the outer air at a distance from the cholera hospital, and the results should be compared.

38. A similar set of experiments should be performed with moisture condensed from air taken from a vessel containing cholera excreta. The object of this is to ascertain whether any special organized bodies which may have been discovered in cholera excreta can be carried into the air, and afterwards deposited.

39. Similar experiments should be made by wetting articles of ordinary clothing in cholera excreta containing special microscopic objects, allowing them to dry, and then agitating them in an enclosed body of air, so that any dust from them may be condensed, and submitted to the microscope. The results should be carefully described and figured.

40. As already stated, condensed matters so obtained, found to contain appreciable organisms or not, might be used in experiments on animals.

Examination of excreta of unaffected persons.

41. Another class of facts, either positive or negative, might be obtained by examining objects found in the condensed breath, cutaneous exhalations, or excreta of persons who have been in close communication with cholera cases in hospitals, or who have lived in cholera localities. In this class of experiments the persons who have been so exposed should be removed from the hospital or locality before the microscopic examination is completed.

§. VII. Chemical Enquiries.

To be comparative.

1. These enquiries should be carried out at selected stations exempt from cholera, as well as at one or two stations where cholera is endemic. They should be undertaken during periods of health, and at epidemic seasons.

Examination of air.

2. They should include enquiries as to the constituents of the atmosphere, with special reference to estimating the amount of organic matter in air taken four or five feet from the surface of the ground.

Examination of water.

3. The same experiments to be made with air in localities specially the seats of cholera. The constituents of air in cholera wards to be likewise examined chemically.

4. The rapid progress being made in water analyses throughout India will afford most of the information required about the water supply. But in order to have the requisite means of comparison, a chemical examination should be made of water in selected cholera localities at various periods, with the view of ascertaining whether any and what physical and chemical changes have taken place in the same waters during the prevalence of cholera.

5. Water used in selected localities exempt from cholera should also be examined.

6. The more important sanitary points of such an enquiry are:—

(*a.*) The amount of *rapidly oxydizable* organic matter in water.

(*b.*) The amount of ammonia, muriate of soda, nitrites, nitrates.

(*c.*) The amount and character of other salts.

7. A chemical re-examination should be made of the serum of the blood in healthy persons and in persons suffering from cholera, in comparison with rice-water discharges in cholera. The comparative degree of opalescence of the two fluids, and the effect of dilution on this property in each, should be observed and described.

8. The influence of disinfectants on cholera excreta should be examined, and the results, microscopical and physical, stated. It is important to ascertain which disinfectants can best prevent decomposition of cholera excreta, and arrest the development in them of organic life.

REGISTER FOR RECORDING REGIMENTAL CHOLERA CASES

During an epidemic visitation, when Medical Officers are suddenly subjected to a great increase of labour, and have their anxieties and responsibilities equally augmented, with possibly the inconvenience and discomfort of a movement of the troops, it is not of course to be expected that they can always make *post-mortem* examinations. Everything must be subordinated to the welfare of the sick. Where, however, Medical Officers can pursue and record these investigations, the accompanying Register will, it is hoped, economize their time and labour in doing so. The No. column on the left-hand side of each page is intended to furnish a reference by which to trace the medical history of the individual cases throughout.

In the absence of any well-marked character, the separation of ordinary from choleraic diarrhœa must be in great part an artificial one. By the former is to be understood the form of disease such as prevails at ordinary periods, marked by looseness of the bowels, the stools, though fluid, retaining a fœcal character.

The relative amount of fluid excreted in a given time should be noted, as well as the absolute quantity, in consequence of the system sustaining a chronic drain with comparative impunity; while the effect of a sudden but smaller loss might induce shock or syncope.

In recording the character of the urine, its specific gravity, acidity, presence or not of albumen, &c., should be stated.

In the event of a patient dying collapsed, in whom there was little or no diarrhœa and vomiting, the amount and character of the fluids in the intestines should be carefully noted.

FOLIO 1.

*Station*_____

No.	Name.	Age	Date and Hour of Attack.	Patient Attacked in Barrack, Hospital, Officer's or Married Quarters.	Floor of Room (ground, 1st, &c.), and No. of Room.	Number of Men in Room. Amount of Cubic and Superficial Space per Head.	Ventilation (ample, good, insufficient).	If admitted into Hospital, Date and Hour.	Ordinary Diarrhœa.	Recove
1										

No.	Collapse, its Degree, Date, Hour, and Duration of Algide Stage.	Algide Stage.					
		Pulse.	Respiration.	Temperature.	Suppression of Urine, partial or complete, Hour and Duration of.	Patient slept, or not.	Vomiting and Purging continued, an to what extent
1 *cont.*							

No.	Secondary Fever.			Event.			
	Complications.		Treatment.	Death.			
	Pulmonary.	Enteric.		Choleraic Diarrhœa.	Collapse.	Imperfect Reaction	Secondary Fever.
1 *cont.*							

POST MORTEM

No.	Lungs, Size, Weight, and Condition; Pulmonary, Arteries and Veins, relative Amount and Character of Blood.	Liver and Gall Bladder, and Contents, Size, Weight, Congestion, and Appearance of.	Spleen, Size, Weight, and Condition of.	Kidneys.	Bladder.
1 *cont.*					

FOLIO 1.

*Corps or Detachment*_____. *Strength*_____.

Date.	Treatment, and when Commenced.	Transferred to— A. Choleraic Diarrhœa. B. Collapse.	Premonitory Diarrhœa.	Hour and Date of its Appearance.	Treatment.	Whether Symptoms became suddenly aggravated, and the Date and Hour.	Duration and Amount of Vomiting and Purging.

Treatment.	Secondary Fever.					
	Date, Hour, Duration, and Character of.	Pulse.	Respiration.	Temperature.	Character and Amount of Stools.	Complications. Cerebral.

Recovery.			POST MORTEM APPEARANCES		
Choleraic Diarrhœa.	Collapse.	Secondary Fever.	Post Mortem, Hour and Date of, and Time after Death.	External Appearances.	Heart, Size, Weight, and State of Blood, Pulmonary Artery and Veins, State of.

APPEARANCES.		
Stomach and Intestines. Contents: Amount, Colour, Reaction, & Character of. State of Glands, Vessels, Mucous Membrane, and Villi.	Nervous System and other Organs.	REMARKS.

APPENDIX No. II.

DRY EARTH CONSERVANCY, MADRAS.

REMARKS by the Army Sanitary Committee on the Cleansing of Indian Stations referring to a Report on the Dry Earth Conservancy System, Madras Presidency.

THERE are several points of interest closely connected with the ultimate results of public health improvements of Indian Stations, raised by a perusal of this Report on the Dry Earth Conservancy System, which appear to call for remark.

1. In considering any single proposal for improvement, such as the dry earth conservancy, it is necessary to bear in mind that the objects to be attained by public health works and measures are a sufficient supply of pure water, together with the removal, as speedily as possible, of all causes of impurities, solid, liquid, and aëriform, away to a safe distance from human dwellings, and an innocuous and, if possible, a profitable application of such refuse.

2. It is not a sufficient adaptation of this great principle to remove only one class or cause of impurities, and to leave the others; and no sanitary proceeding which does not deal effectually with all of them can be considered as sufficient for health.

3. The following sources of impurity require to be continuously removed from inhabited buildings in India, as elsewhere:—

A. Solid kitchen refuse, including *débris* of food.

B. Rain water which would, if left in the subsoil, tend to generate malaria.

C. All water brought into the station, except that which evaporates. This water is used for drinking, cooking, washing, baths, and lavatories. The amount cannot be taken at less than 12 gallons per head for every healthy man, woman, and child, including servants, and from 30 to 35 gallons per head for every sick man per day, exclusive of water for horses. Although these quantities give the estimate made by the Commission in their suggestions for improving the sanitary state of Indian Stations, it may be well to mention that a special enquiry since made in England and Ireland, for the purpose of saving water, has shown that Infantry regiments require 15 gallons a-head per day at home, including about 2½ gallons for laundry and married soldiers' quarters.

Practically this water in all climates, but especially in India, becomes, if not safely disposed of, an inevitable source of disease and ill-health. It contains a large amount of putrescible matter; and, if urine were mixed with it, it would become so noxious that it would matter very little whether or not the contents of latrines were added to this other sewage.

D. The matter from latrines, including solid and fluid excreta at about 1 lb. per man per day, or, in round numbers, half a ton per day per 1,000 men.

4. The first of these classes of impurities—namely, solid *débris*—are removed by hand labour or by carts.

The rain-fall must be removed, to a large extent, in India by improving the surface, and by impervious surface drains, while the subsoil must be freed from excess of water by subsoil drains.

The refuse water must, under present arrangements, either be passed into cesspits or it must be carried away, or it must be allowed to find an outlet where it can, by surface drains, probably into the subsoil.

It is with the last of these impurities—namely, latrine matter—that the dry earth system proposes to deal.

5. The latrine matter to be dealt with is to the fluid refuse of barracks, hospitals, cookhouses, &c., as 1 to 190: that is, for every pound of human excreta removed under the dry earth system, there are, in every well-regulated establishment, about 190 lbs. of fluid refuse which must be otherwise disposed of.

6. In estimating the influence on health of the dry earth system of conservancy, it is necessary to bear in mind distinctly what it professes to do, and what it professes not to do; for it is evident that whatever advantages to health may accrue from the dry earth conservancy, it deals only with one part out of a hundred and ninety-one of the total injurious barrack and hospital refuse, while it makes no provision for the removal of surface and subsoil water.

Bearing these facts in mind, we proceed to remark,—

7. That there is no doubt of the deodorizing power exerted by dry earth, especially if it contain vegetable mould or humus. There is no doubt also that this deodorizing power is exerted on both solid and fluid excreta. The only questions, therefore, to be dealt with are those of practical application, cost, and subsequent disposal of the deodorized matter.

8. On these points the papers referred to the Committee afford much interesting experience. They show that the quantity of dry earth required for latrines alone is about 2½ lbs. per man per day, proportionally increased if the latrine is used oftener than once.

For 1,000 men, 2,500 lbs. of dry earth must therefore be carted into the station, and distributed to the latrine seats every day; and 3,500 lbs. of mixed deodorized matters must be collected from the latrines, and carted away every day.

9. But the urine from day and night urinals has still to be dealt with, and the papers appear to show that the amount of dry earth required to absorb and deodorize the urine of one man is about 7 lbs. per day, or 7,000 lbs. per day for 1,000 men.

For this purpose, it would be necessary to cart into the station and to distribute 7,000 lbs. of dry earth, besides collecting and removing 8,500 lbs. of saturated earth every day.

10. The total daily amount carted into the station and distributed would thus be 9,500 lbs., and the amount to be collected and carted away would be 12,000 lbs. The daily movement of earth and soil would thus be nearly 10 tons for 1,000 men.

11. The papers further show that great care and constant attention are required in adapting all the parts of the process to each other. Mechanical difficulties have been experienced in the use of hoppers for throwing in the earth. Scoops for throwing in the earth, after using the latrine, are imperfectly applied. Native servants have had to be appointed to this duty.

12. And the whole system on which the dry earth conservancy is based,—namely, the immediate and regular application of earth,—has, in one or two cases, been departed from, apparently on account of nuisance, or difficulty in application of the system; and a wooden mill has been contrived, into which excreta and earth are poured, and ground or mixed together by labour, with the view of more efficient prevention of nuisance.

13. Leaving aside the cost for the present, and its prospective increase as the value of labour rises in India, it is evident that the mere cartage, distribution, collection, and removal of so much earth would present many practical difficulties; and hence Dr. Ranking, the Madras Sanitary Commissioner, proposes to limit the use of the dry earth system solely to latrines, and to deal with the urine separately by MacDougal's disinfecting powder.

14. The cost of latrines alone, without the urinals, is apparently the same as on the old system of conservancy, about 25*l.* a-month, or 300*l.* a-year, for a regiment of 1,000 men.

If the dry earth system were used for urinals, it would add 120*l.* a-year to the cost = 420*l.* per annum for 1,000 men = to a capital sum, at 5 per cent., of 8,500*l.*

15. The chief method in use for disposing of the deodorized excreta of stations is by burying them at a distance from the station. But it is evident that, in the course of time, such a practice must result in fouling large areas of

ground—and for this reason, that the quantity of earth with which the excreta are mixed is much too small to absorb permanently the products of decomposition. Hence in these papers it is stated, that even after careful mixture of excreta with earth, the mass, when buried, gives out offensive vapours in rainy or damp weather.

16. It further appears, that when a small quantity of the deodorised and buried excreta is taken up and diffused in water, the resulting fluid is found, under the microscope, to teem with vibriones and other forms of organic life,—the very forms which some writers have included among the causes of Asiatic cholera.

17. Without laying undue stress on this fact, it still may be taken as showing that in India the earth process and subsequent burial are inadequate for the requirements of health, at least in the case of large fixed populations; and that if this process is to be continued for such populations, it must be modified and brought more in accordance with natural laws.

18. There is no doubt that earth is the great assimilator and neutralizer of all decaying organized matter. It incorporates the organic elements with itself, and renders them useful for the nourishment of living vegetation. It is through the medium of the earth that the entire cycle of life and decay is completed.

19. But every agriculturist knows that, for practical purposes, decaying matter must bear a very small proportion to the whole body of earth, otherwise the earth becomes unwholesome. With some manures this amount is almost infinitesimal. The true principle, therefore, in applying excreta to soil is to do this as an agriculturist would do it,—not to bury it in a hole, to the danger of poisoning both water and air, but to plough or dig it in, so as to bring the decaying matter into immediate contact with a large body of earth, and then to convert it into living, useful produce by agriculture.

20. This being the case, the only question is how to bring about this union of decaying substances with the soil most easily, continuously, and cheaply.

21. It is evident that the dry earth system as at present carried out, according to these papers, can, at the best, only act as a means of deodorizing in the intervals between the daily removals of the latrine matter, and at a time preceding the disengagement of putrid emanations (that is, on the assumption that the latrines and urinals are cleansed daily); but that a much better and safer method of disposing of the matter, after removal, is required, than any hitherto in use.

22. There is, at present, the cost of carriage and labour; and the labour must be so organized that no break in the arrangements can take place. To complete the process, there must be means of applying the refuse to the soil otherwise than by burial.

But if the deodorized latrine matter were used for agricultural purposes, it must be borne in mind that all manure must be in solution before it can be taken up by plants; and if it must be in solution, it may as well be conveyed in water. Now, conveyance by water in England costs only a tenth part of conveyance by cart.

23. Foul water, already containing manure in solution, exists at the stations, and is not removed by the dry earth system; but it is absolutely necessary that this foul water, derived from the water-supply carried into stations, should be removed from them. By far the cheapest way of doing this is by sewer-drains; and if there be drains for foul water, there is no reason why the latrine refuse should not be carried away in the same drains. It is true that the cost of water-latrines and drainage must be considered in any comparison of outlay.

The first cost of trough-latrines, or soil pans, may be taken at 1*l.* sterling for every 10 men. The first cost of drains will vary according to the site, and distance of outfall; but in any case, there must be drains, unless the foul water is carted out of the station.

24. To have two systems of cleansing stations,—a foul-water system and a dry-earth system,—would simply be paying double where one payment would answer; or if all the excreta, solid and liquid, are to be carted away, this must be done at a cost ten times greater than that which would be necessary if removed by drains.

25. We shall conclude this part of the subject with a few remarks on the methods adopted for carrying out the dry earth system, as shown in the papers.

In the first place, if this cannot be done without the aid of mills, and such like apparatus, the system ceases to be the dry earth system, and becomes something else; while it may be safely asserted that of all the systems hitherto contrived for dealing with excrementitious matters, this one in which excreta and earth are ground together in a mill is least in accordance with civilized habits.

Secondly. If the dry earth system is to be carried out, it should be in strict accordance with the methods laid down by its advocates, who are responsible for its results.

Third. The dry earth system, as applied to latrines and urinals, is nothing more than a temporary expedient for deodorizing the matters, but whether the matter becomes injurious or innocuous thereafter depends not on the dry earth system, but on the use to which the deodorized excreta are put.

Fourth. Excreta in the fresh state, or mixed with earth, should never be disposed of by burial. They should be ploughed or dug into the ground simply as manure, and the manured ground should be cropped. In this country (England) application of saturated earth to agriculture is part of the dry earth system.

Fifth. Whether the dry earth system be used, or not, for latrines and urinals, the health of stations will be only partially improved, unless provision be made for removing away from stations all the foul refuse water as well as the malaria-producing subsoil water of the stations.

26. It will be seen from what has been stated above that the removal of latrine matter is simply an incident in the drainage of a station, and that in draining a station we have only to consider the population and the amount of water supply brought into the station, and fouled by domestic use. The real question is how this foul water can be most easily and cheaply removed. It is necessary to enunciate this principle broadly, because the amount of nuisance from imperfect latrines in such a climate as India has naturally drawn the attention of medical and other officers to the necessity for abating this nuisance to the possible underrating of sources of disease from the foul water of stations, of equal, if not of greater, importance.

27. At all stations in India where there is sufficient fall, and water properly provided, there can be no doubt whatever of the greater economy of removing the foul water, or rather allowing the foul water to remove itself by drains to an outlet where it can be applied for irrigation.

If this be not done, a system would have to be organized for collecting and carting away the foul water at stated periods (leaving it to become putrid in the intervals of removal) at a cost probably ten times as great as would be required if it were allowed to flow away by properly constructed drains.

28. Again, the construction of latrines to be cleansed by water, as already stated, would probably not exceed 1*l.* for 10 men, against which would have to be placed the cost of dry earth latrines; while if foul water drains were laid down, the contents of these water latrines could be permitted to flow away as often as needed, to prevent all decomposition. This proceeding would involve no additional cost, as the same tube drain would serve for both purposes.

29. Cases in which there is deficient fall might be supplemented by raising the latrines and other drainage heads above the level of the ground, or the sewage might run into a water-tight tank at a distance from the station, and lifted by a pump worked by a steam-engine, or otherwise to the level necessary for disposing of it.

There is, however, scarcely a plan which has come before the Committee showing a fall in the ground which would render natural drainage impossible.

30. Practically very small falls are required, and drains laid level may be flushed at short intervals by comparatively small volumes of water.

This subject has been considered in our suggestions for the sanitary improvement of Indian Stations, and the leading principles are there stated by which unfavourable levels may be rendered more available for drainage.

31. We have already shown that a station, say for 1,000 troops, would require 12 gallons per head per day for every healthy man, woman, and child, including servants, and from 30 to 35 gallons per head for every sick man. Now, in practice, it is found that a 2-feet sewer laid with a fall of 5 feet per mile, or rather less than one in 1,000, will remove 3,000,000 of gallons of water silently and continuously in a day of 24 hours. In other words, it would drain away to an outlet the foul water, including the latrine drainage of 150 stations, with 1,000 men in each of them, if they were all within reach of such an outlet sewer.*

32. It may be useful to append the accompanying Table prepared by Mr. Rawlinson, showing the amount of water which can be removed by drains of different sizes at different uniform velocities.

The lowest velocity in the Table is 1 foot per second, and the smallest drain pipe is four inches in diameter. A main drain with these elements would remove twice the water supply of a station for 1,000 men. Suppose that a pipe sewer 9 inches in diameter were used, this would drain away the water supply of 10 stations for 1,000 men each, and even if laid for a station of 1,000 men, it would cost, according to the Table, 4*s.* 6*d.* per linear yard, equal to 396*l.* per mile, or not much more per mile for a permanent self-acting work than would be necessary for a single year's cost of the dry earth system for latrines alone, excluding the whole foul water of the station.†

33. It can never be predicated of any station, unless it is below the level of a river or the sea, that it has not sufficient fall for drainage. The eye is no guide. It is almost certain wherever rain falls on apparently flat alluvial country, that it has hollowed for itself outfall lines, the position of which can be determined by survey. Without levels nothing can be done in deciding on the drainage peculiarities of a flat country.

34. But supposing that the station were at the lowest point of a flat district, it could still be drained. Almost the whole of the south district of the metropolis is at or below the River Thames level, and it has nevertheless been sewered. The same may be said of West Ham and its neighbourhood, and of Worthing. The outlets in these instances are obtained by pumping.

This auxiliary agency of pumping is used to a much greater extent than is generally supposed, even where fall exists, because it is found to be less costly than a distant natural outlet.

In Cornwall and in Staffordshire, clay mixed with water is pumped and transmitted through pipes several miles in length.

In great dredging operations, sand and silt are dredged into pipes, through which they are transmitted to shore.

All the sewage of the town of Worthing, about 700,000 gallons per day, water supply and subsoil drainage, with the excreta of 12,000 persons, are pumped and transmitted through a pipe one mile in length, and 12 inches in diameter. The low-level sewage of the metropolis, on both sides of the Thames, is pumped and transmitted through sewers.

The sewer which drains the barracks and station at Hounslow is laid nearly on a dead level, and the sewage is pumped on to the land.

35. But perhaps the most useful data are those supplied by Aldershot, because they include the application of sewage to agriculture in a purely military district.

The area of the permanent barracks and South Camp, actually sewered, amounts to 331 acres.

* Refuse water is discharged at unequal intervals during the day. In calculating the capacity of outlet-sewers the entire daily volume of fluid refuse should be provided for in eight hours. An outlet-sewer of two feet diameter, having a grade of 1 in 1,000 would therefore serve 50 stations with 1,000 men in each station.

† It will not be advisable to adopt 4-inch pipes for outlet-sewer drains for several reasons. It will cost as much or nearly as much to excavate a trench for a 4-inch pipe as for one of nine inches in diameter, and the slightest inequality or abstraction in a 4-inch pipe would tend to block and choke it. As set forth in the "instructions" tributary drains should join mains of larger diameters, as 4-inch into 6-inch, and 6-inch into 9-inch. As there will necessarily be tributary drains in all cases, outlet-sewer drains should not therefore be less than nine inches in diameter, and there should be man-holes for inspection and flushing at each 100 yards in length.

The maximum population on this area is 12,458 persons, together with 2,286 horses.

The amount of water supplied from reservoirs, exclusive of a large amount drawn from wells, is 210,000 gallons a day.

36. For the removal of part of this water from the barracks to the outlet, after it has been used for domestic purposes, there is a sewer 18 inches in diameter, with a fall of 1 in 100 at the higher end, and 1 in 980 at the lower. For the camp there is a sewer 18 inches in diameter, with a gradient which varies, but the average is only 1 in 1,000.

37. The ordinary depth of sewage in the 18-inch barrack mains, including 2½ inches of deposit at certain points, is 6½ inches for wet weather, and 6 inches for dry weather, showing a section of 54·17 inches in dry weather.

The depth of sewage in the South Camp 18-inch main is 3 inches in dry weather, and 4½ inches in wet weather, exclusive of deposit of 3 inches at a point where there are difficulties of level. The dry weather flow has a sectional area of 27·7 inches.

38. The local rainfall at Aldershot averages about 28½ inches per annum. This rain-water escapes over the surface and by underground pipes (which are kept perfectly distinct from the sewage pipes) into the nearest stream or ditch, and so into the Blackwater River.

39. The sewage and rain-water system are thus kept distinct, but a small quantity of rain nevertheless finds its way into the sewers proper. An inch of rainfall throws about 47,000 gallons of rain-water on the irrigated land, with the ordinary sewage.

40. The Aldershot sewage farm contains 130 acres, 77 of which have been under irrigation, some of it for several years.

When the sewage was first applied there was no vegetable soil, properly so called, on the common. The surface consisted of reddish and yellow Bagshot sand, with layers, more or less dense, of iron-sand, locally termed "pan," which required to be broken up before the ground could be prepared for crop.

This ground contained 95 per cent. of silica, 3 per cent. of protoxide of iron, and a trace of vegetable matter. The surface, to a depth of 4 to 6 inches, was in many places nearly as hard as concrete.

41. Perhaps the very worst possible soil has in this experiment been brought under successful irrigation and culture. All the elements of the question have been dealt with, and the result has been that the offensive barrack and South Camp latrines have been abolished, the station drained, all the refuse water rendered innocuous by irrigation, and the fertilizing matter removed out of it and applied to the production of food on ground which had previously yielded nothing in the form of useful vegetable produce.

Mr. Blackburn, the lessee of the Aldershot farm, has been so good as to afford to us some interesting information regarding the method of cultivation adopted.

42. The ground under irrigation is square in form or plan, and has a fall of 25 feet from the point where the sewage is admitted to the lowest point in a distance of 550 yards, the fall being unequally distributed: the average is 1 in 66.

43. Out of such material as that mentioned above, a ferruginous sand which in its natural state was destructive to vegetation, a true vegetable soil had to be formed. The iron concrete crust, or "pan," had to be disintegrated by trenching and breaking up, and then drenched with sewage for almost a year before any crop was sown. Surface trench drains were put in where necessary; and sewage drains, 160 yards in length, formed by the plough and finished by the spade, were carried across the line of fall for distributing the sewage. Mr. Blackburn estimates the amount of water supply at 790 tons, or about 177,000 gallons a-day, of which two-thirds reach the farm during twelve hours of the day, as sewage, the other third as water during the night.

44. The whole of the sewage is absorbed by the land during nine months of the year.

45. During the very hot summer of last year the amount of sewage was scarcely sufficient to keep the plants alive, showing that in hot climates small areas of ground would be sufficient for absorbing the barrack refuse water.

46. The whole sewage of the South Camp and barracks was not turned on to the farm until 1866, scarcely three years ago, and the following have been the results, as regards produce raised *per annum* on each acre :—

Potatoes	4 to 5 tons.
Swedes	12 „
Mangolds	18 „
Garden turnips	300 bushels.
Cabbages	16,000 plants.

There is besides a large area under Italian rye grass cultivation, which is cut five or six times a-year for cows, and four times a-year for horses. The lowest cutting averages 6 tons per acre, the highest 14 tons per acre. The maximum produce is 40 tons of rye grass per acre per annum.

47. As the culture advances, the number of articles is increased. The usual cropping of the farm is as follows :—

Potatoes	26 acres.
Italian rye grass for food	29 „
„ „ „ hay	15½ „
Green crops	6½ „
Total	77 „

This absorbs the whole summer sewage of the camp and barracks.

48. The crops to be raised this year will be Italian rye grass, potatoes, mangolds, swedes, turnips, cabbages, tares, onions, carrots, and haricot beans.

49. There has been no smell from the farm : the earth deodorizes the sewage as soon as it touches it. There are no complaints of nuisance from the irrigated land, nor of injury to health. All the plants grown are healthy looking and wholesome for consumption, although at first there was some prejudice against the produce, now, however, removed.

50. With this experience before them, and in order to ascertain how far this method of disposing of barrack sewage would be applicable in India, the Committee would beg to suggest whether some one Indian Station might not be improved on similar principles, and the sewage rendered available for supplying troops and horses with farm produce.

51. But of course no system of station drainage, including the application of sewage to agriculture, can be carried out until the station is properly supplied with water.

52. Already the question has excited attention in India, in consequence of the recommendation in Mr. Rawlinson's Report on the Drainage of Bombay, which has been concurred in by Captain Tulloch, R.E., that the entire sewage of this great city be applied by irrigation to agriculture.

In conclusion. The Committee has thought it might be advantageous to discuss the whole question of the drainage and cleansing of Indian Stations, with the view of directing attention to its several bearings.

It will be seen that the fundamental point in the question is the removal out of the station of all water brought into it for domestic use.

The cheapest way of doing this is by drains laid to an outlet ; and if drains be provided, there is no reason why the latrines should not be connected with them. But if from local circumstances it be impracticable to remove refuse water by drains, then the other alternative of collecting it carefully and carrying it away would have to be adopted, and in this case the latrine matter might be separately dealt with for agriculture.

Earthenware pipe-drains will deliver water or sewage at rates as under:—

Diameter of pipe in inches.	Gallons at one foot per second.	Gallons per minute.	Gallons per hour.	Gallons per day of 24 hours.
4 inches	0·5	30	1,800	43,200
6 ,, ...	1·2	72	4,320	103,660
9 ,, ...	1·7	192	9,720	233,280
12 ,, ...	4·8	288	17,280	414,720
	Gallons at 2 feet per second.			
4 inches	0·10	60	3,600	86,400
6 ,, ...	2·4	144	8,640	207,320
9 ,, ...	3·4	324	19,440	466,560
12 ,, ...	9·6	576	34,560	829,440
	Gallons at 3 feet per second.			
4 inches	1·3	90	5,400	129,600
6 ,, ...	8·6	216	12,960	310,980
9 ,, ...	5·1	486	29,160	699,840
12 ,, ...	14·4	864	51,840	1,244,160

N.B. Cost, including the pipes laid complete, about 6*d.* per lineal yard for each inch in diameter.

APPENDIX No. III.

MEMORANDA FOR THE GUIDANCE OF THE COMMISSION OF ENQUIRY INTO THE ORIGIN AND PROGRESS OF THE RECENT EPIDEMIC OF YELLOW FEVER IN JAMAICA, ESPECIALLY WITH REFERENCE TO ITS PREVALENCE AT NEWCASTLE, 1867.

It is to be feared that, owing to the faulty methods too often employed in determining the nature and relative value of the agents which have been alleged, at different times, to occupy a prominent or a subordinate position among the factors of yellow fever, the main subjects for elucidation still remain unsolved, spite of the accumulation of facts which has been presented to the minds of medical and other writers from the last century up to the present period.

It is, therefore, beyond all things necessary to submit all the facts to the most critical examination, with the same rigorous exactness that would be employed in a chemical or physical investigation. And in doing this, although it may be necessary to pass in review and analyse a large number of details, it is especially desirable so to sift and arrange the facts that are relevant to the subject, that the grounds on which the conclusions are pronounced may be as clear as practicable.

In the present instance it would appear that yellow fever occurred and continued to prevail, circumscribed within very narrow limits, at Newcastle, 3,000 or 4,000 feet above the sea-level. It has been generally considered that a certain elevation of temperature is an essential element in the causation of this disease, and that as such temperature did not obtain at this altitude, neither yellow fever nor the severer forms of tropical disease could be generated, or, if originated and introduced from without, could spread. Previous occurrences in Jamaica, the Peruvian Andes, and elsewhere, have proved these statements of Humboldt, Dr. Fergusson, and others to be inaccurate; still there can be very little doubt that elevated localities have enjoyed a relative immunity from this class of diseases. It will be therefore very important to obtain all the facts which can throw a light on the occurrence and persistence of yellow fever among the troops at Newcastle, in order to determine whether personal or local causes, separately or combined, have given rise to conditions which rendered the effect of altitude—inimical to the origin and spread of fever as it apparently is—inoperative and futile when overborne by other and more active conditions, such as can be referred to *general* or *climatic* causes; to *natural* conditions of soil, as productive of malaria; to insanitary conditions of soil, site, and drainage, *artificially* induced by the products arising from human habitation; or from *personal* conditions, such as the introduction of a cause from without (the morbid manifestation of its activity being evidenced in the person of an individual previously exposed to the disease in the plains, and spreading from that source as a centre); or from the effects of overcrowding or defective ventilation.

All the details connected with the medical history of previous epidemics are (upon the authority of Inspector-General Lawson, whose opinion has been taken on the subjects embraced in this document) to be found in the historical register of the office of the Principal Medical Officer in Jamaica; and Dr. Lawson's pamphlet on the subject is enclosed for perusal.*

To facilitate the collection of evidence, and to place it in a form suitable for examination at a distance, it is advisable to pursue the following course:—

* Observations on the outbreak of yellow fever among the troops at Newcastle in 1856, by Robert Lawson, Deputy Inspector-General. — "British and Foreign Medico-Chirurgical Review," October 1859, page 445.

1. A correct plan of the Island of Jamaica, together with another plan of the hill station of Newcastle, should be obtained, the latter on a scale sufficiently large to admit of every building, &c., being indicated by a distinctive mark or number, also showing the site of the tents occupied during the epidemic.

2. A description, as succinct as possible, of the general features of the physical geography and medical topography of the station; and, if the materials be available, a meteorological table sufficiently detailed should also be included.

3. A brief notice of the prevalence of yellow fever of late years among the civil population, as well as among the sailors and military of the colony, and the state of health of the population generally for the five or six months immediately antecedent to the appearance of the epidemic in question. The sanitary condition of the towns in which the disease prevailed, particularly as regards the cleanliness, drainage, water supply, and house accommodation.

4. The origin, progress, and extent of the late epidemic, including a very short sketch of any medical occurrences of importance in the other West India Islands. It would be as well to illustrate the occurrences, as far as Jamaica is concerned, in a chronological series on the chart or plan. The report should include the population of the island, its distribution into the various districts, as well as the strength of the garrison, including the women and children—distinguishing the white from the black troops—and the prevalence and mortality from the disease among these various classes.

5. The name of every man, woman, and child attacked with yellow fever (and there are facilities for tracing this out as far as the military are concerned) wtih the date of attack, and of death or recovery, with the leading symptoms, or any combination of these symptoms, such as "became yellow," "had black vomit," or epistaxis, or bleeding from gums, melæna, or hæmatemesis, the presence of albumen in, or the suppression of urine, or two or more of these. The house in which each person resided when attacked, and how long he had been residing there before attack, as well as whether he had been away from the station within a fortnight previously, and if so where he had been, and for how long, and when he returned, should all be ascertained in each case as far as can be. The particular duty or occupation of each individual attacked for some time previous to that event is important.

6. The number of persons in each room, house, or tent, at the commencement of the disease at Newcastle, and whether these remained unchanged during its progress.

7. If the persons occupying any room, house, or tent, were removed during the course of the epidemic, the place to which removed and the date to be mentioned, and whether any others took their place in any of these rooms, or houses, or tents.

8. The means of ventilation in the various rooms, &c., and whether they were working efficiently during the epidemic. Whether the windows of the rooms were shut after sunset.

9. The position of the latrines, drains, and urinals, and their state during the epidemic.

10. The quantity and quality of the drinking water during the period.

11. Whether, as regards Newcastle, the bush had been allowed to spring up close to the buildings, or whether it had been kept down, and if so to what distance, especially in the ravines. This to be indicated on the plan.

12. Whether there had been any collection of filth or refuse on the slopes at the outlets of the drains, either before or during the progress of the epidemic; or whether unpleasant odours were perceptible in their vicinity.

13. If cases arose among the attendants on the sick and patients in hospital, every particular as to the wards occupied by these, and their relation to the sick, to be detailed.

14. If the hospital was shut and the sick were removed to another situation, this to be specified, with the arrangements carried out, as to separation of fever cases from others or otherwise. The position where women and children were treated also to be specified.

15. A nominal return of every person who attended those sick of fever to be obtained, with the date of employment and for how long continued. If the

same individuals were employed more than once the particulars to be given, with the dates. Any of these persons who were subsequently attacked with fever to be specially noticed, with the date, character, and results. Similar details to be given for those who attended women or children affected with fever.

16. It may be as well to express an opinion as to whether the more frequent appearance of yellow fever at Newcastle of late has had any reference to the fact that formerly hill cantonments in Jamaica were used almost exclusively as convalescent stations for regiments which had passed some years in the low grounds and become more or less acclimatized; whereas now the troops are sent, on arrival, to Newcastle, and remain there during their tour of service.

17. Finally, the Commission is to report what works and measures are required for improving the health of the station, and for diminishing the liability to recurrences of these outbreaks of fever.

REPORT OF THE COMMISSION APPOINTED TO ASSEMBLE TO INVESTIGATE THE ORIGIN, PROGRESS, AND RESULTS OF THE EPIDEMIC OF YELLOW FEVER IN THE ISLAND OF JAMAICA IN 1866 AND 1867.

(The following is a somewhat condensed copy of the Report, dated September 1868. The appendices containing many of the maps, details, tables, &c., which were necessarily rather voluminous, have been either abridged or altogether omitted.)

The Commission appointed by the Honourable the Major-General Luke Smythe O'Connor, C.B., Commanding the Troops,—consisting of Colonel Sir H. Johnson, Bart., Deputy Adjutant-General, R. J. O'Flaherty, Deputy Inspector-General of Hospitals, and Lieut.-Colonel Grain, Commanding Royal Engineer,—having assembled, and carefully considered the letter of the Right Honourable the Secretary of State for War, together with the several papers and instructions enclosed for their guidance when investigating the origin, progress, and results of the epidemic of yellow fever which affected the civil and military population of the island of Jamaica in 1866 and 1867, proceeded to arrange for the collection of facts relating to the subject; and having framed a convenient form of return, containing columns for the insertion of each of the requisites enumerated in paragraph 5 of the Instructions, forwarded several such forms to the Colonial Government, requesting that they might he completed by the medical practitioners residing in each parish of the island, by the insertion of all cases of yellow fever that had occurred in the several districts under their care.

Similar forms were forwarded to the Officers Commanding the several corps in the island, and to the Commodore Commanding the Royal Naval Force upon the station, who were also requested to furnish replies to queries in paragraphs 6, 7, 8, 11, 12, 13, 14, and 15 of the same Instructions.

On the receipt of the information required, which occupied some period of time to collect from the Military and Naval Forces, and a very much more protracted period on the part of the Civil authorities, it was deemed advisable by the Board to collate the necessary information from the several documents forwarded, into as condensed a form as possible; and to best accomplish this, they have divided the return of cases of yellow fever into two parts—one for the Civil population of the island, and the merchant seamen frequenting its ports; the other for the Military and Naval forces—detailing each case as it occurred in chronological order, from the first observed case in July 1866 to what may be considered as the termination of the epidemic in January 1868.

Tables have also been constructed to show readily the numbers, dates, and places of attacks and deaths, with other tables showing the same for previous years—the latter up to 1837, copied from returns in the Parliamentary Report of sickness and mortality in the West Indies, published in 1838; and from that time to the end of 1867, compiled from the documents in the Principal Medical Officer's Office in Jamaica, thus completing the medical history of the force from 1802 to 1867.

In addition to the detail of cases, the Board have appended a general summary of events in each parish, and have replied to the several queries of their Instructions in such a manner as they trust will place "the evidence in a form "suitable for examination at a distance."

The Board now proceeds to reply to each paragraph of the Instructions as fully as possible.

Appended is a small map of the island; since its publication the number of parishes has been reduced from 22 to 14, but the counties have not been altered. This map shows the military stations, post-offices, mail routes, carriage and rail roads, and other very useful information.

The chart plan of the island exhibits the present division into parishes, the principal towns and seaports, and military posts, with the roads from Kingston to Up Park Camp, Stony Hill, and Newcastle.

A plan of the Hill Station of Newcastle, on a scale which admits of every building being indicated by a mark or number, also showing the sites of the tents occupied during the epidemic.

Newcastle is situated in the parish of St. Andrews, about 15 miles in a direction north and east of Kingston; is in about 18° 15′ N. lat., and in long. 76° 15′ W.; and, as the crow flies, about 9 miles from the south and 14 from the north coasts of the island; about 30 miles from the east, and 150 from the western ends of the same.

At a distance of 14 miles north and east of Kingston, a range of mountains, called the Blue Mountains, extend in a line running nearly east and west through the island, dividing the north from the southern shore.

The range is lofty, and its two highest peaks are the most elevated of all the mountain ranges.

The westerly one is called St. Catherine's, and has an elevation of 5,036 feet; that at the eastward is known as the Blue Mountain Peak, and has an elevation of 7,325 feet.

The eastern extremity of this range, at about 5 miles from the shore, extends in a northerly direction, sloping to the sea near Port Antonio.

The western extremity extends itself towards the Liguanea Mountains, which it joins near Stony Hill; but, like the eastern end, there turns northward, descending to the coast about Annotto Bay.

On the southern watershed of this range, the parishes of St. Andrew, Kingston, and St. Thomas in the East have been formed, and, on its northern, St. Mary's and Portland—all these parishes being in the county of Surry.

From this range numerous spurs arise and descend, in larger or smaller ridges, to the lowlands, some very gradually, affording fertile and arable highlands, on which coffee and provisions of all kinds are profitably cultivated, providing also cool and tolerably accessible places upon which agreeable mountain residences have been built.

The St. Andrew's portion of this range consists of a series of these irregularly-shaped and deeply serrated mountain ridges abounding in precipices, having their sides deeply grooved by the smaller watercourses, giving a most remarkable appearance to the general configuration of the country. The deeper ravines collect the upper streams or rivulets into several small rivers which unite some four miles below Newcastle, forming the Hope River, and finally pass to the sea near to Castile Fort, and to the eastward of the Long Mountain.

From the south-western side of St. Catherine's Peak two ridges are formed, which extend themselves in a southerly direction. The most westerly is, at its upper extremity, broad and gradually sloping; upon this the cantonment of Newcastle is built. The second, which arises from the main ridge at a much lower elevation, is called "The Farm", upon which buildings have not yet been constructed.

To the westward of the ridge on which Newcastle is built there is a very deep valley, and smaller ones are upon each side of the Farm ridge. In the bottom of each flow mountain streams which are never dry, and thoroughly drain the whole district in the vicinity of Newcastle, uniting below Middleton, (a small village and coffee property at the foot of the Newcastle ridges), flowing thence through the pass (up which the mule road to Newcastle is conducted) to another village and military picquet post called "The Gardens", at the foot of

this pass, where other streams are collected; and about one mile further to the southward is again united with a small stream from the westward, at Gordon's Town, becoming the Hope River, passing to the sea as already described.

From Middleton to Newcastle, in each of the valleys, the watercourses and sides of the ravines are covered with bush; but the western valley has much more cultivated land on its slopes, and there is no marshy ground in the vicinity of Newcastle.

The district is generally considered a very healthy one for all classes of its residents; intermittent and remittent fevers are not common amongst whites or blacks, and, except in epidemic seasons, are not intractable or very fatal, and with white residents scarcely any other disease is observed; while amongst the black and coloured population, dysenteries in some seasons are prevalent, and occasionally fatal; and pectoral diseases in these mountain districts are not uncommon amongst the Creoles.

It may safely be asserted that, generally speaking, this district is remarkably healthy; and as much so as it is possible for any tropical district to be that is not completely cultivated, and that has large tracts of mountain slopes and ravines covered with bush.

The geological structure of the district is best illustrated by the map No. 3 in the Appendix, copied from that in the Government Geological Museum in Spanish Town, which is from the geological survey of the island, but has not yet been published.

The soil about Newcastle is a red clay, not retentive of moisture, as soon after the heaviest rain every part of the cantonment is perfectly dry, water lodging nowhere, the general configuration of the ground causing perfect natural drainage.

The climate is cool and very agreeable, but occasionally it is complained of as being damp, and after rains foggy; but the physical appearance of men, women, and children, after a residence of some time there, is that of persons in a temperate climate.

A meteorological table is attached for the past year at Newcastle. (*Vide* p. of Meteorological Returns in Appendix.)

There has been no epidemic of yellow fever in the island amongst either civil or military population since 1856-57, when for the first time it became epidemic at Newcastle. (A *précis* of the reports in the Principal Medical Officer's Office was annexed, and the tables of strength, admissions, and deaths, from 1802 to 1867, showing the years of epidemic fevers.) On every occasion these affected all classes of the community, civil, military, and naval; the précis shows that occasionally bodies of the latter force have been epidemically affected in the harbour af Port Royal, their sick landed and treated there, and no special means adopted to prevent further communication, without the disease extending itself anywhere on shore.

The years 1819, 1822, 1825, and 1827 appear to have been the years of greatest mortality prior to 1842, since then 1853–4, 1856–7, and 1867 have been the three years that have exhibited any large mortality from epidemic yellow fevers.

Taking the whole period of 30 years, since the publication of the Parliamentary Report of sickness and mortality in the West Indies, there have been four epidemic years, three of these resulted in great mortality. One in 1841–42, before Newcastle was built, and the other three alluded to.

The population of the island generally had good health in 1866, and in the early part of 1867, cases of yellow fever had occurred amongst the seamen and travellers by steam-ships, but there was no great accession of fever.

The military body was not so free from febrile diseases, as Table No. 4 shows that the mortality from these was greater than for some years previous, and the admissions in the years 1865 and 1866, far exceeded in number that of any previous year since the removal of white troops to Newcastle. This is in some measure to be accounted for by the services of the troops in 1865 and 1866 being required in the lowlands during the rebellion at the end of 1865, and at Port Antonio and Up-Park Camp in 1866 and the early part of 1867, when the 2nd Battalion 6th Regiment suffered severely from fever; and the occurrence of 138 cases of fever in 1865, and 93 in 1866, at Newcastle, was attributed by the Surgeon of that regiment to the frequent relapses of men who had con-

tracted fever when on duty in the lowlands; only one death however occurred from fever at Newcastle in 1866.

After the arrival of the 84th Regiment at Newcastle in April 1867, it remained free from fever until 9th May, during which month 18 cases were admitted, and in June, until the first case of yellow fever was recorded, 18 cases of remittent fever were treated, no death occurred amongst the men, but one woman died in May; scarlet fever prevailed amongst the children as well as diarrhœa, causing five deaths from the former and six by the latter. Several women also had fever after arriving from Malta. Diarrhœa was very prevalent amongst the children during the voyage to Jamaica.

The towns in which the epidemic disease was most observed were Kingston, Spanish Town, Port Royal, and the sea-ports where merchant-ships' men most collected, on Black River, Savannah La Mar, Falmouth, Annotto Bay, Port Antonio, Port Morant, Morant Bay, Montego Bay, Old Harbour, and Carlisle Bay in Clarendon.

Kingston is the commercial capital of the island, it is situated near the head of the great harbour, which has its commencement at Port Royal, the dockyard and fort of which latter place command the entrance.

The town was very well laid out originally, has large, wide and regular streets, and good stable lanes running north and south, and east and west, at right angles to each other. Formerly it was a very filthy place, had no regular police, and scarcely any sanitary regulations, unpaved, not lighted; it has been much improved during the last ten years, there is now an efficient police, the streets are fairly cleaned and, latterly, have been paved; it is not yet lighted, has only surface drainage, but this is direct to the sea, and very efficient; the inhabited houses are good, and there is sufficient house accommodation for its population, but there are a large number of vacant stores, and many dwelling-houses in a very dilapidated state.

There is no underground sewerage of any kind, the latrines are cesspits and everywhere very offensive.

The water supply is ample and of good quality, supplied by a company that has its reservoir near the head of the Hope River. It is very costly, and it is believed to be beyond the means of many to purchase it.

The position of the town,—close to the sea-shore, from which it ascends towards the north in a gentle slope,—facilitates drainage, and ought to render good conservancy of every kind easy and inexpensive; but the municipal body is at present poor, and many sanitary defects would be remedied were there funds to do it; nevertheless, the sanitary condition of the place of late years has much improved.

Port Royal is the naval seaport at the entrance of the harbour. It consists of the dockyard, town, and fort. All are built upon the extremity of the spit of land which forms the southern boundary of Kingston Harbour. The dockyard is the most eastern part, always kept in good order. The barracks and fort, and military hospital, on the most western extremity, also kept in a good sanitary state. The town, which contains about 2,500 inhabitants, chiefly of the labouring classes, is situated between the dockyard and fort; is undrained, not lighted, not paved, and is generally a filthy and insanitary place. Its community is very poor. The condition of the town has latterly improved,—a public latrine has been built over the sea, and the general conservancy improved by the occasional employment of convict labour. The inhabitants did not suffer with yellow fever. There are few white residents, and these are chiefly officials connected with the dockyard. The inhabitants are black and coloured Creoles, not likely to suffer from epidemics of yellow fever.

The water is good, but the supply is limited. It is brought daily in sailing tanks from a spring at the head of the harbour, about seven miles from Port Royal; is stored in tanks, and delivered daily, in stated quantities, to both troops and inhabitants. There is, however, always enough for all purposes.

The naval hospital is situated between the town and the fort, to which latter it immediately adjoins.

The refuse of the town is placed upon the shore to the south-eastward of the dockyard and fort, with a view of its being washed away by the sea.

This is, however, only partially done, and at times the sea-beach upon this—the windward—face of the place is often very offensive.

Spanish Town is the seat of government. Here are congregated the Governor's dwelling, the offices of the Law Courts, and the buildings that accommodated the late houses of legislature. It is a decaying place. The recent change from a Representative Assembly to a Council of a few persons must of necessity cause it to decline in importance. As the usual means of support for very many of its inhabitants have been withdrawn, the number of compulsory visitors each year being greatly reduced, and there being no trade or business of any kind to compensate for this loss, it must soon cease to be a residence for any but officials connected with the public offices.

It is kept clean, but not paved or lighted; has good and sufficiently wide streets; many houses are in ruins. It is surrounded by much bush and uncultivated land, and has large marshes in its neighbourhood. It had a good water supply, but an expensive one. The water was provided by a public company, but this has ceased. The town is undrained, and the latrines are all cesspits.

There is a large barrack here, formerly occupied by troops, but now in possession of the constabulary.

Black River is a small town and port in St. Elizabeth's parish; it is a small but thriving seaport. Except cases that occurred in the shipping, but one case of yellow fever was recorded in the town,—that of the Surgeon who attended the sick sailors.

Montego Bay, on the north side of the island, in the parish of St. James, is reported by a practitioner residing there, "as one of the cleanest and best-"drained towns in the island; a good and plentiful supply of water; good "house-accommodation, and a very healthy district. There is very little sur-"rounding malaria, or any other cause to make it an unhealthy place."

Falmouth, in the parish of Trelawny, is a clean town; many houses in ruins, but streets and inhabited houses in good order. No case of yellow fever had occurred there for 17 years, and but one during this epidemic,—a captain of a merchant vessel recently arrived from Kingston.

The town has a good water supply; the drainage is defective, as the level of the town is but little above the sea. It is surrounded by marshes, and, when occupied by white troops, was an unhealthy place. In 1867, 4 white officers and 100 black soldiers were stationed there. No man or officer was affected.

Annotto Bay, Port Antonio, Port Morant, and Morant Bay, are small seaport towns, all unhealthily situated as regards rivers and bush, unoccupied and uncultivated lands,—very different from former days, when frequented by many sugar ships annually. Houses in occupation and general conservancy are as good as their present means will admit of; but to recently-arrived Europeans, they are unhealthy places, as well as to natives and the acclimatised, being localities very prolific of febrile miasmata.

Yellow fever was not reported to exist in any of the West India Islands prior to June 1866; but in 1866 it was epidemic at Demerara, in British Guiana, and very fatal to the white troops then stationed at George Town.

According to the very complete and instructive report of the Surgeon-General of the United States' Army, upon the epidemic of yellow fever in the armies of America in 1867, so considerately forwarded for the information of Medical Officers upon this station, yellow fever was prevalent in New Orleans in the summer and fall of 1866, but no statistics are given for this year. It appears to have ceased about December, commenced again in June 1867, rapidly became epidemic and very fatal along the Atlantic seaboard of the United States, as well as in the towns upon the Mexican Gulf, from whence it was carried, or extended itself, into the interior, by the great inland route from Mexico, and from New Orleans by the Mississippi and Red Rivers, extending itself in each region higher than had been previously known. It is believed by the Surgeon-General to have been introduced from Vera Cruz into the former, and from Havannah into the latter.

Cholera was epidemic in the United States in 1866 and 1867.

The Island of St. Thomas, the packet station of the English Royal Mail

Steam Company's ships, and general rendezvous of vessels of all kinds plying from all quarters of the globe through the West India Island routes, was affected with yellow fever in the spring and autumn of 1866; it was very fatal to the crews of these vessels, in some instances not ceasing immediately after arrival in England.

It was also prevalent at Colon, the Atlantic port of Panama, and early in 1867 Havannah was known to be affected; and towards the end of this year cholera was also epidemic and very fatal at Havannah, and an outbreak of this plague was added to the sad catalogue of misery and pestilence which prevailed at St. Thomas throughout the year, which was finally brought to the excess of misfortune a community could possibly meet with by the dreadful earthquake, and consequent losses of ships and people in the harbour and neighbouring sea, which happened in November, but, remarkably, without the effect of obliterating either the yellow fever or cholera. Cases continued to occur until the beginning of 1868.

Towards the end of 1867 some few cases of yellow fever occurred amongst the troops in Barbadoes, but they were not followed by any general epidemic in that island.

In November and December of 1867, cholera of a very fatal form affected the inhabitants of British Honduras; it also affected, in an epidemic form, several of the Republics of South America.

Up to the present time Jamaica has escaped from cholera, though it is again epidemic at Havannah; and cases of yellow fever are reported in the same place.

Previous to July 1866 there had been no cases of yellow fever reported in the island since the occurrence of two deaths of Army Medical Staff Officers at Up Park Camp in 1865, and no general epidemic in the island since 1856 and 1857.

In July 1866 a vessel from England, anchored at Port Morant, had the Captain and several of the crew ill with fever, which proved to be yellow fever, as reported by the Staff Assistant-Surgeon then stationed at Morant Bay, and the Health Officer at Port Morant, both of whom had visited the sick, and were assured of the nature of the disease. The cases were reported to His Excellency Sir Henry Storks, then governing the island, who ordered the vessel to proceed to sea.

From that time until October 14th, 1866, no other case was reported as occurring in the island. On the 14th of this month a sailor of the merchant ship "Jamaica" died in the civil hospital in Kingston, having previously exhibited all the symptoms of yellow fever. The date of attack was not recorded. This ship arrived in Kingston on 7th October, was from Glasgow, but last from St. Thomas; she sailed for Black River, on the south side of Jamaica, on the 19th October.

On the 24th and 27th October, two seamen from Royal Mail steamship "Wye" died in the public hospital with similar symptoms. She arrived on the 19th October from St. Thomas, and sailed again for the same place on 24th October.

November 16.—A seaman from the barque "Grace," then in harbour at Kingston, was admitted to public hospital in a moribund state, and died the same day. The vessel arrived on 16th November from St. Thomas, and sailed on 29th for Black River.

November 19.—A clergyman, who had arrived but a few hours before by Royal Mail steamer, was attacked with the disease, and died on the 26th; he touched at St. Thomas on his way from England, where he had spent five months, but had previously resided in the island of Jamaica for 28 years.

November 26.—A seaman of the barque "Grace" is recorded in the public hospital list as discharged cured on this day: the date of attack is not recorded.

November 21.—A seaman, acting as servant to the commander of the gunboat "Nettle," then at anchor in Morant Bay, but recently arrived from Fort Morant, landed with his master; both were accommodated with sleeping places in the military officers' quarters; the detachment then stationed at Morant Bay consisted of one Ensign, one Assistant-Surgeon, one white soldier,

Army Hospital Corps, and 25 black soldiers, 3rd West India Regiment, all of whom resided in the same house.

The sailor servant, immediately after landing, was attacked with and died of yellow fever on fifth day of disease. Staff Assistant-Surgeon D'Arcy, who attended him and followed his remains to the grave, became ill the following day, and died with similar symptoms on the 14th December.

The gunboat, with its commander, left Morant Bay immediately after the funeral, and arrived at Port Royal on 25th November. The commander was transferred to the "Aboukir" the same day; on 26th November he felt unwell; on 27th he was sent to Royal Naval Hospital, where he died on 6th December, with yellow skin, and other symptoms of the malignant form of yellow fever.

No case had previously occurred at Port Royal, and only the five above detailed had occurred in Kingston, and, with one exception, all were seamen, and, without exception, all had previously and recently been at St. Thomas, where the disease was epidemic.

Early in December Her Majesty's ship "Cadmus," which is reported as having anchored at Port Royal, from Cape Haitien, on 21st November, was sent to Kingston to enable the ship's company to have leave on shore, the ship being then free from disease; the men returned from leave on 8th December, on which day one seaman was admitted with fever, followed by two more on the 9th, one on the 10th, and another on the 12th; all but the latter died; and the Naval Hospital return states:—"Several men of the 'Cadmus' were associated "with seamen of ships from which cases of yellow fever had been sent to "public hospital."

The "Cadmus," after sending the cases to hospital, departed for North America.

The next case recorded is that of a seaman on board the guard-ship "Aboukir," at Port Royal, from which Lieutenant Jenkins, late of the "Nettle," was removed to hospital on 27th November, and in which he had been two days ill. This seaman had been four days on leave in Kingston, when the "Cadmus" men were there, from 8th to 12th of December; he died on 25th, having been attacked on 13th, and admitted to hospital on the 14th December.

December 16.—A case occurred on board the "Nettle," previously noticed as at Morant Bay, now 21 days in Port Royal Harbour; he was on leave in Kingston on 14th December, and returned on 15th; was attacked on the 16th with fever, admitted to hospital on the 21st, and died the 24th.

Four civil cases were reported in Kingston in this month, two captains and two seamen of merchant vessels, belonging to the ships "Rosina," "Lord Stanley," and "Olivia"; they had been 5, 12, and 16 days in harbour prior to attack; three recovered and one died; the former arrived from Porto Rico, and the two latter from Cardiff, yellow fever not existing at either place; but there were three steamers in the harbour during the month, "The Seine," "Danube," and "Conway," plying between Colon and St. Thomas, which were the last ports they had touched at.

In January 1867 there are 16 cases recorded in the Civil Returns, and five in the Naval; five of the former were fatal, and occurred in Kingston; the latter all recovered.

The civil cases occurred in the mail steamers from St. Thomas and Colon, and two of the fatal cases were from the barque "Mary Ann," which arrived from a non-infected port in America on the 9th November.

A child, four years of age, died of the disease in Kingston four days after arrival from Halifax, on 10th January, 1867.

Four seamen, of a barque at Old Harbour, laden with coals, and last from St. Thomas, name not given, were attacked, and recovered; and a wharfinger, a native of the island, assisting in the vessel, was also attacked, and recovered; there were no cases previously at Old Harbour.

The "Aboukir" and "Steady" furnished the cases that occurred at Port Royal; the latter vessel arrived from Black River on the 4th January, and on 22nd the commander and one seaman were sent to hospital, and another on the 24th; all recovered.

In February there were five cases at Port Royal, three from the "Steady," who recovered; a clerk in the dockyard, also recovered, the first case on shore at Port Royal; and the fatal case was that of Assistant-Surgeon Richardson, attached to the Royal Naval Hospital, and who had attended the last case at his house, as well as in the Naval Hospital, within the bounds of which he resided.

Three cases occurred between the 8th and 27th.

In Kingston three cases were admitted, but four deaths occurred. One fatal case was a seaman from a lodging-house, and the other cases were from a brig, the "Summer," which arrived at Kingston from Cardiff on 25th December.

On 26th February a soldier of the 2nd Battalion 6th Regiment, stationed at Kingston, was attacked with fever; he was sent to Up Park Camp Hospital, and afterwards to Newcastle, where he died with symptoms of yellow fever on the 4th March.

In March there were no cases in Kingston in the civil population, but in the parish of St. Ann's a livery-stable keeper died of the disease immediately after his return from Kingston; he had got wet on his journey; this is the only case recorded in that parish during the whole year.

Ensign Newman, 2nd Battalion 6th Regiment, was attacked with fever at Up Park Camp; he was sent to Newcastle for change of climate; he died there with symptoms of yellow fever on the 10th March.

In this month there were 18 cases and two deaths in the Royal Navy at Port Royal.

The cases occurred in "Aboukir," "Nettle," "Doris," and the dockyard; the fatal ones were from the "Aboukir" and "Doris"; the latter ship went to Kingston to give her men leave on shore, and on her return to Port Royal (as in the case of the "Cadmus"), she sent nine men to hospital with fever, three of whom died, and the recoveries are marked on the return as doubtful cases.

The "Doris" had no previous case.

The "Doris," after leaving her sick in hospital, proceeded to the north with a view of getting rid of the infection. Several of the cases of the "Aboukir" and "Nettle" had been on leave to Kingston immediately prior to their admission to hospital.

In April there were three cases and three deaths in the civil population in Kingston—one, a person immediately after arrival from St. Thomas, in the east; the second, a seaman from the barque "Gem," which arrived from Norfolk, United States, a non-infected port; and the third, an engineer, 42 days resident in Kingston, after arrival from United States, waiting to join a Peruvian man-of-war; his companion, another engineer, living in the same house, and waiting for the same ship, and a similar period in Kingston, died on 4th May, and is included in the list for that month.

At Port Royal the "Aboukir" furnished three cases and one death, and on 6th April the "Aboukir" was removed from the dockyard moorings to a buoy opposite the garrison. On the following day a soldier, Gunner Day, Royal Artillery, felt ill, and was removed to hospital, where he died of yellow fever on 12th April.

On the occurrence of the case, it was recommended that the Royal Artillery be moved to Newcastle, and in a few days a majority of the Battery was sent there. Of those left at Port Royal, one was attacked on 25th; and on same day a white colour-serjeant of 3rd West India Regiment became affected, and died on 27th; the Artilleryman lingered on, with much hope of recovery, until 7th May; in the meantime, two others of Royal Artillery became ill, and will be further noticed in the following month.

In April the Naval Force had eight cases and three deaths at Port Royal, viz., six cases and three deaths in "Aboukir," and one case each in "Nettle" and "Cadmus," the latter ship having returned from America.

In May there were 21 cases and six deaths in Kingston, 17 were seamen, of whom four died; a fifth was the second engineer alluded to in the April cases, and the sixth was a girl, aged 13 years, a native white person of Kingston, where she had resided since her birth.

Port Royal Naval Force furnished three cases and one death, the fatal case

being the chaplain to the "Aboukir"; he was not long in the island, resided on shore, and attended the sick in Naval Hospital, where four patients had contracted the disease, followed by one death.

In this month the Royal Artillery at Port Royal had two more admissions and three deaths, the last of the men that were allowed to remain at Port Royal.

A detachment of the 3rd West India Regiment, stationed at Port Royal, consisting of two white officers, one Assistant Staff-Surgeon, and 120 men, with one white colour-serjeant, whose death is previously noted, had one officer and an officer's wife (both residing in officers' quarters) attacked with the disease, the latter on 7th and the former on the 8th May; the lady had visited the wife of the chaplain of the "Aboukir," whose death is recorded in this month; they were both removed to Up Park Camp, the officer to a ward in the hospital of that station, and the lady to a separate house in the occupation of the late Staff-Surgeon Dunlop, who took her under his care. The officer and lady both recovered.

On the occurrence of these cases, the Major-General Commanding ordered all white officers and soldiers to leave Port Royal, and Staff Assistant-Surgeon Forbes, who had attended the cases, accompanied the sick officer and lady to camp, and on arrival there, on the 10th May, was attacked with fever; he was removed from the officers' quarters to a hospital ward, and died there on the 15th; he had previously lived in the same building with the officer and lady at Port Royal; but all the cases in men of Royal Artillery and 3rd West India Regiment had previously occurred in the same barrack; and two of the Royal Artillery, Serjeant-Major Lyons and Corporal Green, occupied lower rooms in the officers' buildings, and very near where the officer and lady resided, but the latter was the only person who had any communication with the family of the chaplain.

The white troops did not return to Port Royal until November, when the husband of this lady had a mild attack, and recovered.

In April all white soldiers were moved from Up Park Camp to Newcastle, except the white officers and non-commissioned officers of 3rd West India Regiment, there stationed, and the officers and non-commissioned officers of Staff and Departments in Kingston, and the white military prisoners undergoing punishment in Kingston Penitentiary, a building well isolated, situated on the sea-shore, to windward of Kingston, and in which no case of yellow fever occurred during the epidemic.

Of the above, but two were attacked with yellow fever. Assistant Commissary-General Travers, nearly three years in the island, during which time, and until a short time previous to his seizure, he had resided at a distance of about four miles from Kingston, moved to the latter place on the departure of his family for England, and was attacked on the 19th June, and died on the 25th.

June 22.—Lieutenant Foote, Royal Engineers, employed upon duty at Up Park Camp, but chiefly resident at Stony Hill, and riding a good deal in the sun, was taken ill with fever on 22nd, at Up Park Camp; had a very slight attack, which is recorded by the Surgeon as yellow fever, and was convalescent on the 25th; was removed to Newcastle, where he arrived on 29th, the date of the first death of 84th Regiment from yellow fever at that station. At the time of his illness commencing, his wife and child, at Stony Hill, were ill with dysentery, from which they recovered, and on a visit to her at the same place, was the widow of the chaplain who died at Port Royal on 6th May; this lady, after her husband's death, removed to a residence in the mountains, above 4,000 feet, where she remained some time; she then went on a visit to Stony Hill, where, it appears by the civil returns, she was attacked slightly on the 12th, and recovered on 17th May.

June 26.—Five very suspicious cases were admitted to hospital at Newcastle, four of whom had yellow skins and hæmorrhage; one of them, Burton, died on 28th June, and another, Walsh, died on 5th July; the others ultimately recovered.

Burton had been absent and drunk in the lowlands from 13th to 23rd June, and was sent from the guard-room to hospital; Walsh had been employed at the Gardens picquet-house, a post at the foot of the pass leading to Newcastle, an elevation of about 1,300 feet, from 8th April to 19th June, from which

place he was removed in consequence of intemperance. On his way to Newcastle he got wet, and was admitted to hospital on 26th; both had black vomit, yellow skins, and albuminous urine, and were considered to be cases of yellow fever.

Privates Watson, Tomlinson, and Costella, were severe cases, but recovered; their diseases were not changed, in admission-book, to yellow fever, to which class no doubt they belonged, until some time had elapsed.

These five cases resided, two in F, one in G, one in D, and one in the Provost tents, in their first position, as marked on map of Newcastle.

June 30.—A woman in a tent below the married quarters, and another in O hut, had fever, the latter with symptoms resembling yellow fever.

On the occurrence of these cases, it was recommended that two companies should be encamped on the open space near to the upper officers' quarters, marked Racecourse, and the huts generally to be reduced in their number of occupants; the women to be moved from the tents to P hut, a new building then ready for occupation; the woman in O hut having a room to herself, was not removed.

These recommendations were carried out the following day; both women recovered, and only two cases afterwards admitted to hospital during the epidemic from the camp, then formed. These happened on 21st August and 21st October,—the former a servant to the bandmaster, who resided in officers' quarters nearest to the barrack hospital; the latter had been drunk, and absent for several days previous to admission.

The civil return for this month gives 31 cases 9 deaths in the island, 29 cases and 8 deaths in Kingston, one case no death in St. Andrews, and one case one death in Trelawny.

The cases in Kingston included the Surgeon-Superintendent of Civil Hospital, three clerks, all of whom recovered; one lady, a resident in the mountains, a native of the island, and only one day in Kingston, died.

Seven other deaths were seamen, three of whom did not belong to ships at the time, and the four others belonged to vessels then in harbour, one from each of the following:—"Red Jacket," "Alice," "Rover," and "Banshie"; the latter only lately arrived from an infected port, St. Thomas, on 29th May, and her first case occurred on 8th June.

The case in St. Andrew's is that of the widow of the chaplain of the "Aboukir," at Stony Hill, which has been noticed before.

That reported as occurring in Trelawny was the captain of a vessel, the "Red Jacket," who was taken ill at sea, and died soon after arrival at Falmouth. This vessel was last from Kingston, where it had two cases and one death in its crew. These were attacked on 21st and 25th May. She was from Cardiff, and arrived at Kingston on the 24th May; therefore her first case was contracted on the voyage, and before her arrival at any port. The death took place on 2nd June. She left Kingston for Falmouth on 29th May, and the captain died on the 8th June. No other case is reported as occurring in this parish, and Dr. Scott, of Falmouth, states that no case has originated in Trelawny for the last 23 years.

The Navy at Port Royal in this month gave six cases and two deaths; the latter included the Deputy-Inspector of Naval Hospital, which place was then considered to be itself infected; it was soon after closed, and the sick removed to Apostles' Battery, on the western side of the harbour.

The "Aboukir" gave two cases, no death; the "Constance," two cases, one death; and Naval Hospital, two cases, one death.

At Newcastle, from 26th June to 5th July, when the second death occurred, there were eight admissions for fever; three of these were ultimately recorded as yellow fever, one of whom, Private Mitchell, died on 30th July; he was admitted from E hut on 4th July, with remittent fever, and changed to yellow on 16th. The 2nd case, Private Mallon, was admitted 30th June, changed to febris typhoid on 3rd July, and to yellow on 17th; he was from M hut. 3rd case, Private Simpson, was admitted on 30th June, changed to yellow on 16th July; he was in M hut prior to admission, but is returned as attacked while in hospital; both these cases recovered.

On 7th July a gunner, Royal Artillery, living in a tent on the ridge marked Farm on the map, was admitted with all the symptoms of yellow fever, but

albuminous urine. He was recorded as remittent fever, and is consequently not returned. He recovered, and there was no case from this place until 10th August—Gunner Nobbs, who recovered.

The next case was on 9th July, from I hut, disease being changed from remittent to yellow on 17th. This patient had yellow skin, albuminous urine, and slow pulse. He recovered, and from this date to the end of the year every case having albuminous urine, combined with fever, was returned as yellow fever.

On 11th July there was an admission from K hut. It was recorded as yellow fever on 16th, and died on 17th July.

12th July, one admitted from F hut, changed to yellow on 16th, and died on 17th July.

14th July, one from K hut, recorded as yellow on the 17th, and died 18th. Was servant to the Serjeants' mess.

15th July, one from F hut, marked yellow on 17th, died 18th. One from M hut, same day, recovered.

16th July, there were four admissions: two from K hut; one died 30th July, one recovered; one from G hut, died 31st July; one from F hut, recovered.

17th July, one admission, died 5th August. Had been a patient in hospital from 2nd June to 16th, when his disease was changed from typhoid to yellow fever.

19th July, one admission; had been previously an hospital orderly for two days, but previously in G hut; he recovered.

20th July, one from G hut; had been an hospital orderly for two days; died on 25th August; and one from J hut, recovered.

21st July, two from G hut, recovered.

23rd July, one proved fatal; admitted from F hut. One from L, recovered.

24th July, one from F hut, died 28th July. One from G and one from L, recovered.

25th July, one from B hut, recovered; he worked in the tailor's shop.

28th July, one fatal case from F hut; died on 29th; attacked on 27th.

29th July, two cases from Donnybrook Camp, to which they had moved on 21st and 24th July. Private Kelly on former day, who it is stated in return arrived at Newcastle from Kingston Penitentiary 14 days previously; but on inquiry it is stated that he arrived there on 3rd June, and occupied G hut. Private O'Brien, who died, was encamped on 24th, but had been previously in F hut.

During the month of July every effort was made to encamp the men on the most eligible sites above the barracks and officers' quarters.

Donnybrook, an elevated and open space, cleaned and levelled by the 2nd Battalion 6th Regiment, was occupied on 21st and 24th July; and one company and the hospital tents were established at Clifton Mount, the highest available part of the hill, on a very convenient cleared spot of ground, of the adjoining coffee property of Dr. Hamilton, on 27th and 29th July; but the final evacuation of barracks, huts, and hospital, was not effected until 14th August, after which no sick were treated there until the cessation of the epidemic in December 1867.

In the lowlands, in the month of July, the civil population presented 45 cases and 23 deaths. These were distributed over seven parishes.

Kingston Harbour furnished 15 cases and 6 deaths of seamen belonging to eight vessels then in harbour, not one of which had previously touched at an infected port. Cases occurred in those vessels at periods varying from one to three weeks after arrival.

In the parish of St. Andrew's, at a private residence situated at about 4 miles due north of Kingston, a white nurse was attacked on 16th July, and died on 21st. She had been in the lowlands three months, but had previously resided in the mountains.

In St. Catharine's parish, at Spanish Town, two recent arrivals in the island, and one a three years' resident, were attacked, but recovered.

At Old Harbour Town, but some distance from the bay, a very malarious district, a clergyman who had resided ten months in the island became ill and died. He had previously visited Kingston, as well as Old Harbour Bay.

St. Elizabeth's parish furnished 15 cases and 9 deaths; and according to

the statements of Drs. Adolphus and M'Catty, copied at length in the Civil Return for July, all the cases that occurred in the parish, and all but two in the parish of Trelawny, had their origin in a sailor on board a Russian vessel, the "Togmonops," then at anchor at Black River, and last from St. Thomas's, an infected place. This sailor died of yellow fever, was attended by Dr. Simpson of Black River, and visited also on board by a Mr. Salmon. Both took fever; the former died, the latter recovered.

It is stated by Dr. Adolphus, that after the burial of the sailor the crew imagined he had been buried alive. To satisfy them, the body was exhumed late in the evening; Dr. Simpson attended, examined the body by placing his ear to the chest, &c.; two or three days after he was taken ill, and died as above stated.

At the exhumation a black servant of Mr. Manley's was present in the graveyard. He afterwards went to his master's house in St. Elizabeth's Mountain district, as marked upon chart. The house is situated upon the top of a solitary hill, about 1,300 feet high above the sea, and near Newport, 25 miles from Black River, and about 32 from Montego Bay, on north side of the island, a town in the parish of St. James's. At this house he was visited by Drs. M'Catty and Kelly, where also eleven others of the family were attacked—nine whites and two blacks. Five of the whites and the two blacks died. The others recovered, including the black servant who was at the exhumation.

Dr. Kelly, on return to Montego Bay, after five days became affected and died. He was there attended by Drs. M'Catty and De Leon, who transmitted the fever to their wives and families. Dr. De Leon's wife died. Dr. M'Catty's wife and three brothers were attacked; two of the latter died. They were all white natives, and long residents in the mountains.

The cases that are not supposed to have had their origin from the above, although they occurred at Montego Bay, were those of the late Judge, a person who died of yellow fever after a residence in the island of about nine months, and another gentleman, a resident of about the same period, who recovered.

In the parish of Westmorland, at Savannah-la-Mar, there were seven cases and four deaths. They occurred in ships in harbour, last from St. Thomas's and Kingston, both infected places.

In St. Mary's, on the north side of island, at Annotto Bay, there were three cases and three deaths in a vessel, the "Hanover," which left Kingston the 2nd July, having had cases and deaths there. Those that died at Annotto Bay were contracted at Kingston, or on the voyage to the bay.

During July there were no cases in the Royal Navy at Port Royal. The sick had been removed to Apostles' Battery, the officers and crews of "Aboukir" and "Constance" were restricted to their ships and the dockyard, and there were no white troops in the garrison.

At Newcastle, August 2nd, two were admitted: one from I hut; one from 14 room, married quarters. Both recovered.

August 3.—One, two days an hospital orderly, previously in M hut, died 5th August.

August 5.—One from N hut, died 10th August. One from M hut, recovered. One from L hut, recovered.

August 6.—One from L hut, recovered.

August 7.—One from N hut, recovered.

August 8.—One, hospital orderly two days, died on the 9th.

August 9.—One from L hut, recovered.

August 11.—One from M hut, died on the 14th; went off guard to hospital. One from K hut, died on 16th; went off guard to hospital.

August 16.—One from Garden Hill Camp, died on the 19th; encamped 12th August.

August 20.—One from hospital, died the 22nd. This was a permanent orderly; after sick was removed, he remained in hospital to assist about stores.

August 21.—One from Racecourse Camp, servant to bandmaster noticed in July, recovered. A soldier of Army Hospital Corps, living in barrack hospital, and acting as cook, had a severe attack, but recovered. He soon after claimed his discharge, and it is stated that he died of the same disease in mail steamer on his voyage to England. On this day the wife of the Hospital Serjeant,

living in a tent at Clifton Mount, with her husband and children, was prematurely confined of a dead child. She had the previous day undergone much fatigue in walking to the lower huts of the barracks. After the birth of the child she was attacked with fever, had black vomit, and died on the 23rd. This was the only person connected with the tent hospital establishment who had fever, or died of it.

August 23.—A married soldier, in 24 room, married quarters, who was employed painting barrack cots, under hospital verandah, died in tent hospital on 25th August. A colour-serjeant, residing in staff-serjeants' quarters in west side of huts, on a level below the hospital, was admitted to hospital, and recovered.

August 27.—The schoolmaster, occupying a separate hut about upper centre of huts, on a platform upon which no soldier's hut exists, but in part of whose hut the school children assemble, was attacked with fever; he recovered. His wife and family resided with him. The former was attacked on 27th October; she also recovered. Both were mild cases.

The last case in this month was a mess-waiter residing near the mess; he recovered. He attributed his illness to getting wet after attending a wedding at Irish Town, a village about 3½ miles from Newcastle, but nearer Kingston. The mess-serjeant's wife, who went to the place, had fever, but it was not recorded as yellow.

During this month a detachment of the 3rd West India Regiment was sent to perform guard duties at Newcastle; and it was recommended that all employés not in the married quarters, and all the prisoners in cells, should be removed to tents. This was not considered practicable.

From 27th July to 7th August no men were encamped, the Commanding Officer not considering that there was any more eligible ground upon the Government property for encampment. On further examination, such places were discovered and occupied. During this delay, the companies remaining in huts had ten cases and six deaths.

The remainder in huts were encamped on 7th, 11th, 12th, and 14th of August, after which they had but three admissions, followed by two deaths. First at Garden Hill Camp, three days after removal to tents; the other at Quarry Hill Camp on 11th November, having moved to it on 14th August, three months having elapsed.

In the lowlands there were 20 cases and 3 deaths; they recovered.

In Kingston parish two cases and one death, both seamen, not belonging to ships in harbour.

At Up Park Camp a soldier of Royal Artillery died; he was employed at Government House in Spanish Town, where he was seized with fever, removed to Up Park Camp Hospital, and died on 20th August.

In St. Andrew's parish, about four miles from Kingston, on the Newcastle Road, and in a penn adjoining the one where the nurse was taken ill and died in July, on 1st August a gentleman and lady occupying the same house were attacked; the former died on 5th and the latter on 7th August; and on 1st August, in a penn on the opposite side of the same road, but the houses at a great distance from each other, a lady was seized with yellow fever, and died on 20th August, but not before she had been moved from the residence in which she was attacked, on the same day as her neighbours, to a friend's residence, situated on the top of the long mountain to the eastward of camp and Kingston, and marked upon the chart; here she remained a few days, then died; this family left the place, and moved to a house in St. Andrew's, north about two miles, and up the mountain side, from the houses in which the lady and the two others were attacked on 1st August resided; and in the details of the ensuing months will be seen that two sons of this family, who so kindly endeavoured to make the convalescence of Mrs. R. successful, were affected with fever; one died, the other recovered.

In St. Catherine's Parish, at Spanish Town, two cases and one death, the latter a Government surveyor, only two weeks in the island; resided in lodgings at Kingston previously.

At Old Harbour, one case and one death—a clergyman, three years in the island.

In the parish of Portland, at Port Antonio, where there was stationed a

detachment of 3rd West India Regiment, consisting of one officer, one Staff Assistant-Surgeon, and 25 black men, and one white non-commissioned officer of Army Hospital Corps, there was one case and one death, that of the Medical Officer, who was attacked on 21st and died on 24th August. The civil practitioner who attended him, but since dead, attributed Dr. Richardson's death and illness to riding about a malarious district after sundown; if so, it was in the effort to be of use to others, as he was the only medical person in the district who could travel any distance, his civil friend being a very aged man, and quite unequal to any hard work. This was the fifth medical officer of Army and Navy who died in this epidemic, which before its termination caused the deaths of one Deputy Inspector-General of Navy, 1 Staff Surgeon, and one Assistant-Surgeon Royal Navy, and three Staff Assistant-Surgeons of the Army.

In St. Mary's, at Annotto Bay, one case and one death recorded, that of a Mulatto boy, aged 13, taken ill on the 8th and died on the 13th, with all the symptoms of the most fatal form of this fever; he had been two weeks in the place, had previously resided in Portland, but it is not stated where.

The cases in the return as occurring in St. James's are those connected with the case at Black River in July; have been fully detailed in the civil return, and shortly noticed in this report for the month of July.

At Newcastle, cases continued to occur, and on September 2nd a very slight case from Garden Hill Camp was admitted.

September 4th, one from Upper Rod Gate Camp, also very slight; was a day or two previously employed escorting a prisoner from the Gardens to Newcastle, got wet, and was much fatigued.

September 6th, a mild case from Clifton Mount Camp; was again at duty on 13th September.

September 8th, one from O hut, a married man, employed in tailor's shop.

September 9th, a woman, Mrs. Driver, from No. 2 room in staff-serjeant's quarters, from which a colour-serjeant was sent to hospital on 23rd August. she was carried to tent hospital, and died there on 23rd September.

September 12th, Ensign Smyth, a recent arrival from England, was admitted to treatment, being ill with fever; he had been fatigued by a long walk, shooting in the vicinity of Newcastle, and had got wet; he was living in a hut with another officer; both were removed, the former to the Surgeon's quarters, near mess-room, marked in chart of Newcastle, Commanding Officer's quarters; the latter to officers' quarters G.

Mr. Smyth had a very severe attack, and the latter was slightly affected in November; both recovered.

From 12th September to end of month no case occurred at Newcastle, and it was hoped that all epidemic action had ceased there; but fresh cases occurred, and will be noticed after the general occurrences in the island for September have been narrated.

In the lowlands, in September, there were but six cases and two deaths; they occurred in Kingston and St. Catherine's.

In Kingston, from the steam-ships "Columbian," "Tamar," and another vessel, the "Port Royal," four seamen were admitted on 1st, 24th, and 26th September. The steam-ships were last from St. Thomas; the "Columbian" gave one death. The "Port Royal" arrived from Black River on 30th August.

St. Catherine's Parish, at Spanish Town, two cases and one death, an officer of the Constabulary, residing there for three months, and a non-commissioned officer, of 11 months' residence, died.

The Royal Navy at Port Royal gave six cases and one death; one case occurred in the "Constance," a midshipman, who recovered. The other five cases belonged to the "Jason," which vessel was sent to Port Antonio to give her crew leave on shore, it being supposed to be a non-infected port; but it was at this station that Dr. Richardson died on 23rd August. The "Jason" then left for the North American station.

October 2nd, Newcastle.—From 12th September to this date no case admitted; this day a soldier's wife, residing in a private hut on the northern slope of prison ridge, opposite to the north side of graveyard, at a considerable

distance and a much lower level, was admitted to tent hospital, and died there on 7th October. It is stated she was exposed to wet and fatigue.

October 11th.—Private Costello, one of the first admissions in June, was again received in tent hospital, from Provost tents (1st position); he had re-engaged for service, got a considerable sum of money, was drunk and absent for several days prior to this attack; the tent in which he resided was on the slope of the hill, above where Mrs. Blake, the last case, lived, and below the Provost Prison, being on the north side of the gully alluded to in paragraph 4, page 32, of Inspector-General Lawson's pamphlet, which states that in the epidemic at Newcastle in 1856-57, two cases of yellow fever occurred in these huts, one of which died.

October 14th, the Adjutant 84th Regiment, a married officer, residing in the quarter from whence Ensign Smyth was moved in September, was attacked, and died on 21st; he had been much exposed to sun and fatigue, and very frequently in the lowlands prior to his illness.

October 17th, a soldier of Royal Artillery was admitted from Artillery Camp, on the ridge called the Farm, the eastern side of the ravine opposite to the slope from which Private Costello was taken ill on the 11th, and Mrs. Blake on 2nd instant; he recovered. This was the second and last case in Royal Artillery after arrival at Newcastle in April.

October 21st, a soldier of 84th Regiment, admitted from Racecourse Camp, had been drunk and absent for five days; he recovered.

October 22nd, a woman from 19 room, slight attack, and recovered.

October 27th, schoolmaster's wife, in hut between E and F, as noted on 27th August, was affected, and recovered.

October 31st, Corporal Lawlor, living in a private hut, on the west side of, and on a level below, schoolroom, was slightly affected, and recovered; he was employed as letter-carrier from the Gardens; his wife and child were also slightly attacked in November.

During October cases occurred on the 2nd, 11th, 14th, 17th, 21st, 22nd, 27th, and 31st. One officer, four men, and three women admitted; one officer, one man, and one woman died. All the cases but three were from the barrack district, in huts or tents, widely separated from each other, and two men only from the higher camps.

In the lowlands, in October, there were 16 cases and 6 deaths; they occurred in five parishes.

Kingston gave seven cases: one death, from steam-ship "Tamar"—the rest recovered.

St. Catharine's, at Spanish Town, a Sub-Inspector of Constabulary died; three months in the island.

St. Mary's, Annotto Bay, a negro schoolmaster, native of the parish, died with all the symptoms of the disease.

Manchester.—One case, no death, in this parish. At Mandeville a detachment of 84th Regiment was stationed, consisting of four officers and 49 men; had no case. This solitary case is said to have been imported from Westmorland, had slept in a house where a case of yellow fever had been.

St. Elizabeth's, at Black River, six seamen, of whom three died, belonging to the "Port Royal."

The Royal Navy, in October, had at Port Royal one case in the "Aboukir," who recovered; two cases, two deaths, in "Constance" (crews then allowed to go on shore); one case in "Barracouta," recovered; and one case in Royal Naval Hospital, the Staff Surgeon in charge, who died in November, having been but a few months in the island.

November 6th, the wife and child of Corporal Lawlor, 84th Regiment, as noted on 31st October, had slight attacks, and recovered; and on same day, Mrs. Talbot was moved from a private hut in the same ravine, and near the hut and tent from whence Mrs. Blake and Private Costello were taken on 2nd and 11th October. Mrs. Talbot died on 10th November, her child recovered, her husband, who attended them, was not ill.

November 8th, Lieutenant Fletcher, in officers' quarters, had a slight illness, and recovered; he was noticed in September as residing in same quarter with Ensign Smyth.

November 8th, Private Loyd, employed at the Provost, and previously in a

tent near that from which Costello was removed on 11th October, was attacked, and died 11th November; he had for some time previously slept in Prison Kitchen. On same day, Colour-Serjeant Fielding was taken to hospital, from Quarry Hill Camp; he also died on 11th November.

November 9th, a prisoner from Provost Cells, was admitted, and recovered; and on same day a corporal, employed at the prison, who, since the removal of Loyd, slept in the same bed in Kitchen, was attacked, and died on 16th November.

On the occurrence of these cases the provost tents were removed to the space in front of the barrack hospital, and near the orderly room, marked on map, 2nd position, from whence Private Sullivan, another policeman, was taken to hospital on the 18th; he recovered; but on 26th another provost private of the same party was taken ill, and died on 30th.

November 18.—A soldier was admitted from Clifton Mount Camp, the nearest company to the hospital tents, on 26th, and on 27th two more, making three from one camp; all recovered. The two latter admissions had been absent for several days at Buff Bay, and on their return were in the guard-room in hut barracks.

On November 28 a woman was taken from No. 15 room, married quarters; she recovered.

In November, ten men, three women, one child, and one officer, were affected. One woman died. Of the four men who died, three were of the provost party; and the woman, Mrs. Talbot, was their neighbour. The colour-serjeant who died from Quarry Hill Camp, gave no special cause connected with locality, or contact with affected persons, for his seizure.

It was during this month that some companies were removed from camp back to the huts. This move was not followed by the occurrence of any case amongst them, although the disease did not finally disappear from the station until the end of December.

In the lowlands there were nine cases and two deaths, occurring in two parishes.

Kingston, seven cases and one death. The death was from steamer "Eider" from St. Thomas; the others were from six vessels in the harbour, only one of which came from an infected port; but all these cases were contracted after arrival in Kingston Harbour. All recovered.

In St. Andrew's, two cases occurred (two boys); one died, the other recovered. It was to their parents' home, a house on the Long Mountain above camp, the lady was removed, as previously related in August summary, from whence the family removed to present residence, where the elder, ten years old, died on 2nd December.

In St. Elizabeth's, at Black River, one case and no death; a seaman belonging to the schooner "Eucha"; where from not stated in return.

During November, at Port Royal, the Royal Navy had one case and recovery in "Aboukir"; and at the Royal Naval Hospital the Staff Surgeon in charge, who succeeded the Deputy Inspector who died in June, was attacked with fever on 29th October, and died on 1st November, as mentioned above.

In this month a white officer of 3rd West India Regiment was affected with a slight attack; he recovered; the white officers of this corps being allowed to return from Up Park Camp to Port Royal in this month, and the officer attacked was the husband of the lady who recovered in May.

At Kingston, on 19th November, Deputy-Assistant Commissary-General Newman, residing in the house in which Mr. Travers, who died in June, was taken ill, and died on 24th November. He had been but a short time in the island.

December 9.—At Newcastle, a prisoner from cells was admitted, and recovered.

December 16.—A woman from 32 room, new married quarters, on same side of ravine as the huts from whence Mrs. Blake and Talbot were taken to hospital, sickened and died on 20th December, in a tent placed near to, and westward of, barrack hospital, to which the sick had been removed from Clifton Mount Camp a few days previously.

December 17.—A soldier from Clifton Mount Camp was admitted; a very slight case.

December 27.—A woman from P hut, recovered; and no other case has since occurred at Newcastle.

In lowlands, four cases and one death.

St. Catharine's, Spanish Town, one case, no death.

Kingston, one case, no death.

Portland, Buff Bay, one case, no death.

St. Elizabeth, at Black River, one case, one death; a seaman belonging to a ship in harbour there.

At Buff Bay the person affected was an officer of 3rd West India Regiment, on leave in the vicinity, and recently from Up Park Camp.

At Up Park Camp, a soldier of 84th Regiment died on 11th December. He was a deserter, and brought in by Royal Mail steamer from Santa Martha on 9th December.

In January 1868 there were five cases and three deaths in a ship at Black River, since which there have been two or three cases at long intervals from each other in different places; but the epidemic ceased throughout the island in this month.

No black soldier or sailor has been reported as affected by the disease.

Black and coloured people have been affected in the following places:—

One Sambo man, a shopkeeper, died in St. Catherine's parish.

Three black servants of Mr. Manley's, in St. Elizabeth's, were affected; two died.

One black schoolmaster and one mulatto boy died at Annotto Bay.

The black and coloured population are seldom affected with this disease.

The white population, especially new arrivals, are the usual subjects for yellow fever.

This latter community is only 13,000 persons, 7,000 of whom are contained in the parish of Kingston, the remainder scattered through the several parishes of the island, the large majority of whom are natives, and acclimatized. The minority—chiefly merchants, the professional classes, and shopkeepers—only reside in the towns. The public officials, soldiers, and seamen, being only temporary residents, and the majority of these but recent arrivals, fully accounts for so many of the latter, and so few of the former, having been victims to the epidemic.

The name of every officer, man, woman, and child, connected with Naval and Military forces in the island, attacked with yellow fever, will be found in the chronological order in which they occurred, with date of attack or recovery, leading symptoms, place of residence, &c., fully detailed in Naval and Military Return.

The same informatian is given for the Civil population and merchant seamen in Civil Return.

Returns are also appended, showing by months, ships, and places, the total number of attacks in both communities.

A Return is also appended, which is as accurate as could be obtained, of the names of vessels of the merchant shipping that had cases while in the harbours of the island, the dates of their arrival, where from, dates of departure, where to, and the number of cases and deaths in each ship.

Some cases occurred in ships before their arrival in Jamaica, that had not previously touched at any infected port; and it is especially worthy of notice, in connection with the question of propagation of yellow fever, and effects of quarantine. The Report in the Appendix to that of the Director-General of the United States' Army, upon the epidemic of yellow fever in 1867, page 147, and in which it is stated that quarantine was established at Pensacola, Florida, on 21st May, by Military authority. On 21st June the English ship "Fairwind" arrived from Jamaica in ballast, and in compliance with general rules was ordered to quarantine for ten days. She had been reported by the health officer as clean, well ventilated, well appointed in every respect, with no sickness on board, excepting the case of the steward, who was suffering from old age and general debility. During the quarantine, one man died very suddenly, reported to have complained somewhat, to have plunged overboard for a bath, and to have died very soon after of congestion; but as the health officer was satisfied that the case did not warrant further detention, and as she

had been thoroughly cleansed and fumigated, she was permitted to anchor off Pensacola City on 2nd July, to take in a cargo of lumber.

Her ballast of stones, freshly quarried from the rock at Kingston, Jamaica, was taken to fill in under and about the wharf at Pensacola, between high and low water.

On 12th July, the Mayor reported that all the crew of the "Fairwind," excepting one, had been sick; three had died, and five were then ill, but that none of the "Stevedore's" had been attacked.

On 19th another sailor died on board, and the vessel was then ordered back to quarantine.

A reference to the return of vessels will show that the "Fairwind" had three cases, and three recoveries, while in Kingston Harbour, which she left on 9th June.

The Appendix to Naval and Military Return contains a statement of the number in each house, hut, or tent at Newcastle, and the changes that occurred in them during the progress of the epidemic.

On the appearance of the first case in Royal Artillery, at Port Royal, a detachment of 84th Regiment, consisting of two companies, was then stationed at Up Park Camp; they proceeded to Newcastle, as well as the Royal Artillery from Port Royal. Tents were provided for all, at the rate of three men to each bell tent, and one tent for each married man. The tents had boarded floors, and each man had an iron cot and the usual bedding. The 84th tents were pitched on the platforms at the flanks of each hut, from A to N; the tents for Royal Artillery on the ridge called the Farm. The Hospital Service was supplemented by two hospital marquees.

In every instance in which a second case occurred in a house or tent, the particulars are related in this report, as well as in the Appendix.

The means for ventilation are doors, windows, and ridge-roof ventilators, and gratings in the stone walls underneath; it is stated they acted efficiently.

The latrines are cess-pits, placed to the west and leeward side of huts (see plan); they are stated to have been offensive; urinals are conducted into them.

The water was sufficient in quantity and of good quality, and never complained of; there are dripstones to each hut, and drinking-water is always filtered through them.

It is stated in Appendix that the bush had grown up to the edge of the buildings, and in June and July it was cleared to a distance of from 10 to 50 yards to the edge of the ravine. The bush in the ravines was not, however, cleared away, as there were collections of filth and refuse on the slopes, and at the outlets of the drains, before and during the progress of the epidemic, and that unpleasant odours were perceptible in their vicinity.

The cases that occurred amongst attendants are detailed, as required, in Appendix.

In barrack hospital, fever cases were treated in Verandah, and when tent hospital was established, each case was, if possible, placed in a bell tent. Women and children were treated in a bell tent when the tent hospital was established. Prior to the outbreak, cases of scarlatina were treated in a bell tent, placed to westward, and near to the hospital in barracks, and the last cases of yellow fever in women at Newcastle were treated in this latter place, being after the re-occupation of the hospital, which was shut on 11th August, and re-occupied on 17th December.

A nominal return of every attendant upon the sick will be found in Appendix.

The Board is of opinion that the more frequent appearance of yellow fever at Newcastle (it being the second epidemic there in 25 years since its establishment in 1842) has nothing to do with "the fact that formerly troops passed "some years in the lowlands prior to their occupation of hill cantonments," as in 1856, the first epidemic year at Newcastle, the 36th Regiment, then stationed there, had a previous service in the Windward Islands, from whence it came direct to Jamaica.

The Board having made a careful examination of the cantonment at Newcastle, recommend:—

1. That the system of drainage be improved and extended, and that cut

stone properly fitted, or brickwork, be employed in the construction of the drains.

2. That if practicable the earth system be adopted for latrines, and that the latrines be increased by two, and that the latrine attached to serjeants' mess be taken down, and on the earth system to be made to accommodate both serjeants' mess and canteen, to be erected on the site of the present canteen latrine, and that a urinal be attached to it.

3. The Board recommend that the refuse from each hut and cookhouse be collected, and daily deposited in such place as the Station Sanitary Committee shall point out.

4. The Board recommend that a new site for a cemetery be selected, and the present graveyard closed as soon as possible.

5. As the Government property at Newcastle is so extensive, about 296 acres, and but a small portion of it occupied, the lower part more densely than the rest, the Board would recommend, for the better preservation of the health of the troops in epidemic seasons, for in all others their general health is remarkably good, that new buildings be erected on the upper parts of the hill for men and officers, so as to reduce the present occupation to that recommended by the Sanitary Committee of London in 1866, viz., that every soldier at Newcastle should have a superficial area of 75 square feet, and 800 cubic feet of breathing space. The Board considers that this would be the very best means of securing a better state of health than now exists, or would be in a recurring epidemic; and to enable this to be done at once, without waiting for the necessary long period an annual estimate would provide for the construction of huts such as now exist, proper places ought to be at once indicated on which the soldiers of the companies in excess of the accommodation at the proposed rate could erect for themselves wattled huts that would provide good shelter, be very commodious, and be well constructed at little cost, and within the quarter after its commencement provide the necessary temporary accommodation for all at the increased cubic space, the comfort of which to each soldier would quite equal the undoubted sanitary advantage that more house breathing space gives to every individual occupant.

According to the Commanding Royal Engineer's computation, at the proposed improved cubic space, Newcastle can only provide for 336 men, and about 50 married soldiers, leaving 250 for new accommodation.

The present proposal makes this at once practical, and the shelter would be sufficiently good until money is forthcoming for new buildings.

It is also recommended that a similar course be adopted for men now sent to the Penitentiary, as it is intended to build a Military prison at Newcastle, and there being required there any amount of hard labour upon roads, and the necessary work to keep that station in good order, and as in the Civil jail in Kingston there is no real labour for white soldier prisoners, the Commission suggests that they be retained at Newcastle, their sentences of hard labour carried out there, and that they build temporary accommodation for themselves upon such site as may be selected, by which means their sentences could be carried out, and the station incalculably benefitted by their compulsory labour.

The Commission, however, under any circumstances would recommend that to prevent in future emergencies the unnecessary expense incurred by the occupation af land not belonging to the Crown, that the Commanding Royal Engineer be required to plan for the encampment of ten companies in the manner here proposed, and as was found practicable during the epidemic; that these places be marked out, and the regiment in occupation be made to clear and platform them ready for use in case of painting or repairing barracks, or any other emergency—in fact, in the manner in which the 2nd Battalion 6th Regiment cleared the space called Donnybrook, which proved so useful to 84th Regiment. This would also give useful and healthful occupation for the men, a matter of vital importance to soldiers serving in the tropics.

The Commission also recommends, both as an economic and a sanitary measure, that a person be located at Newcastle and placed, in the character of a land steward, in charge of the Government property not in immediate possession of, or required by, the troops; that he be required to keep and superintend it as unoccupied woodland should be, not permitting any wood to be cut upon it, or the land to be used in any way but for the Government; that such

wood only be cut as he would select, and which could be renewed by a proper system of cutting and planting, by which means the supply of firewood for the troops would be always certain, and probably at a much less cost than at present to the public: and the general condition of both occupied and unoccupied land be steadily and daily improved, not resting with the opinion of individuals and temporary residents as to how much or little care is necessary for the proper conservancy of such a property, which will afford sufficiently healthy and most picturesque sites for the accommodation of many more than the strength of a regiment.

Under any circumstances it is most essential that the extent to which the ground is to be kept cleared of bush by the troops be at once decided, by the erection of distinct and permanent landmarks.

The Commission having carefully considered all the facts connected with the origin and spread of yellow fever in Jamaica, in 1866 and 1867, and their relation to each other as cause and effect, consider that general and climatic causes were combined in the production of the disease in the island: the former as shown by the prevalence of the disease in the countries marked on the map, and with which Jamaica has not unfrequent communication; the latter by the occurrence of cases such as those at Port Morant and Morant Bay, which had no external origin by any previous connection with ships or persons at infected places, together with those cases that there is little doubt of occurred at sea, prior to their arrival in the island, in ships which during their transit had not visited any infected place.

The cases at Kingston, in October and November, are traced to vessels that had touched at St. Thomas, an infected port. The first case at Port Royal was the Commander of the "Nettle," previously at Morant Bay, and the first case on whose vessel was certainly attributable to climatic causes only; and the succeeding cases in that and other vessels, as to their origin, must be left to the decision of those more accustomed to the investigation of the origin and propagation of diseases of an epidemic character, and therefore more competent than this Commission to declare whether they really had their commencement in connection with the cases that occurred in Kingston in October and November, or are clearly attributable to the Commander of the "Nettle," who was the first case and first death at Port Royal.

After these cases at Kingston and Port Royal in October and November, others followed in December and January, all being seamen. They declined to three only in February, and no case occurred in Kingston in March. It revived then in April, and continued throughout the year until December, when it finally ceased at Port Royal, Kingston, and all other places but Black River, where some cases happened in January 1868.

At Newcastle the epidemic repeated the occurrences that were observed there in the former and first epidemic in 1856 and 1857, viz., that in spite of its altitude, temperature, &c., the yellow fever pervaded that station, and continued to prevail more or less until the end of December, corresponding to the time of its final disappearance in the island—a course, except the partial cessation in September, very similar to the history of events in 1856 and 1857.

The Commission is of opinion that the general epidemic influence existing in the island, however originally introduced, produced the epidemic at Newcastle; and that, as is usual in all seasons of yellow fever, either here or elsewhere, the disease propagated itself by causing all febrile disorders to assume, under its influence, the character of yellow fever, and which was aggravated and made easy for further extension by the congregation of persons most liable to suffer in the most closely hutted part of the hill, where, in the first instance, the greatest mortality occurred.

It is not considered that the disease at Newcastle had its origin in personal conditions, such as are denoted in the Instructions to the Commission, viz.,—
"The introduction of a cause from without, the morbid manifestations of its
"activity being evidenced in the person of an individual previously exposed to
"the disease in the plains, and spreading from that as a source."

The personal causes that could come under this indication were,—

1st. The cases of 2nd Battalion 6th Regiment, sent to Newcastle and died in March; these were not followed by other cases at that station until three months and a half had expired.

2nd. The removal of Royal Artillery and two companies of 84th Regiment from Port Royal and Up Park Camp, in April and early part of May, to Newcastle, affords no evidence of personal causes having any influence—in this instance the first cases in 84th Regiment not being of these companies, and not occurring until six weeks after their removal, and the first case in Royal Artillery not until the 10th August, a much longer period.

3rd. The movement of men of Royal Artillery and 84th Regiment from the Kingston Penitentiary, where no cases occurred during the epidemic, to Newcastle. Table No. 12, in Appendix, exhibits the dates of any subsequent illness, and the dates of first cases of yellow fever, occurring in any of the tents or camps they were first placed in; but two men of the whole party had yellow fever, and this did not take place until 58 days had elapsed after the arrival fo the 84th man, and some time after the epidemic had established itself there, and that in Royal Artillery not until four months and two days after arrival.

4th. Lieutenant Foote, Royal Engineers, had a very slight attack at Up Park Camp, and when convalescent of the disease was sent to Newcastle, where he has since resided. He arrived there on the day the first case died, went to Royal Engineers' quarters, and no case can be attributed to his connection with the disease, and no officer was attacked until more than two months after the arrival of Lieutenant Foote.

The station was not placed under any quarantine, but passes were not given to Kingston.

The Surgeon of 84th Regiment stated that "he did not consider the disease "was imported by any person to Newcastle, but was referable to local causes, "such as offensive latrines, bad drains, growth of bush, and crowding of can-"tonment, &c."

The Commission, after careful consideration of these latter causes, is of opinion that they exist in a minimum degree, as they were not discovered or reported to exist until the outbreak had actually occurred. The latrines are cesspits, and as offensive as such places in barracks usually are. The crowding did exist, as there were two companies more than there were huts for, but these were provided with tents—one to every three men; and, as previously related in this Report, placed upon the platforms near the huts. A measurement of these platforms, as well as the large expanse of the cantonment on each side of the huts, will show that the occupied area was not of the character that could be described as very densely populated; but the Commission considers that this crowding was a tangible factor for the extension of the disease after its appearance at the station, combined with the fact of the men having recently arrived, their personal imprudence in exposing themselves to the sun, and to intemperance in a climate they were unaccustomed to, in a general epidemic season, assisted in causing the natural advantages of altitude and temperature in the tropics to be of less value than had previously been anticipated.

The Commission considers that the epidemic influence existing in the island was the principal cause, and probably the only really efficient factor, for the continuance of the disease at Newcastle, where it is erroneously supposed to have progressed after it had ceased in the plains. A reference to the tables of parishes and stations will show that it decreased or increased in corresponding ratio in both places; and it is well here to remark, with reference to overcrowding, that on the recurrence of the disease in October and November, case occurred simultaneously in the most isolated places, and those most distant from the barrack huts, long after the troops had left them, and where the factor of crowding never could have had any influence.

The Commission point out that, with all the sad loss this epidemic has caused to the Civil and Military populations, the Government has the great satisfaction of being able to demonstrate, beyond any question, that the generous expenditure which established a hill cantonment has not been without a very beneficial result, providing a cool and healthy residence for the white soldier destined to serve in Jamaica, in its ordinary seasons and when in its most unhealthy one, the mortality has been reduced from a former average of 121·3 per 1,000 per annum to 28 per 1,000 annually.

And it is a further gratification to be enabled to state that the mortality at Newcastle, in the epidemic under review, has been less than in 1856-57—an

encouragement for the Commission to further suggest that, in a recurring epidemic, a timely scattering over the hill-side on the occurrence of any case, and if done on the appearance of any general epidemic influence in the island, and prior to the occurrence of any case at Newcastle, a further diminution of mortality may be reasonably expected, if not altogether averted.

In concluding this Report, the Commission again has to regret the delay that has occurred in its completion, but trusts that its construction is in every sense that required by the Secretary of State's Instructions, and that it will afford full evidence of all occurrences in connection with the epidemic of 1867 in Jamaica, and in a form suitable for examination at a distance.

ADMISSIONS and Deaths of White Troops in Jamaica from 1838 to 1867. The previous admissions and deaths from yellow fever in Jamaica from 1817 to 1836 are contained in the Statistical Report of the Sickness and Mortality in the West Indies, 1838, page 45.

Years.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Annual Mean Strength.	Ratio per 1,000 of Deaths to Annual Mean Strength.	Remarks.
1838-39	2,521	4,033	139	1600·0	55·08	No record of Admissions in office.
1839-40	1,994	3,196	145	1602·7	72·07	
1840-41	1,552	2,441	188	1572·8	94 09	
1841-42*	1,153	2,317	282	2096·5	244·03	
1842-43	1,360	..	45	..	33·08	
1843-44	1,493	..	40	..	28·05	
1844-45	1,345	..	43	..	37·08	
1845-46	1,241	..	35	..	21·00	
1846-47	1,189	1,344	37	1239·0	22·00	
1847-48	724	755	19	1004·4	27·60	
1848-49	731	1,110	31	1528·60	43·70	
1849-50	746	976	10	1308·00	13·30	
1850-51	756	1,036	46	1370·37	60·00	Cholera epidemic.
1851-52	796	923	28	1159·50	35·17	2 yellow fever at Newcastle: 20 other cases of yellow fever, but were not stated in records.
1852-53	756	767	11	1914·50	13·80	
1853-54	839	801	40	959·90	49·90	
1854-55	833	695	11	834·40	14·40	
1855-56	838	806	9	1025·00	12 60	
1856-57	714	702	81	983·00	113·40	Yellow fever epidemic at Newcastle and in island generally.
1857-58	559	594	9	1068·00	14·20	6 cases yellow fever at Port Royal; men sent to Newcastle.
1858-59	627	815	2	1298·00	3·20	
1859 ..	624	833	9	1335·00	14·40	
1860 ..	594	485	12	816·50	20·20	
1861 ..	636	521	6	819·10	9·43	
1862 ..	702	452	9	643·80	12·81	
1863 ..	650	616	6	947·60	9·02	
1864 ..	677	755	5	1115·10	7·35	
1865 ..	683	954	17	1396·80	24·87	
1866 ..	735	993	17	1200·00	27·00	Yellow fever epidemic at Newcastle and in island.
1867 ..	788	933	55	1084·00	69·70	
Total..	14,279	15,767	414	22707·17	568·45	
Average.	713·95	788·35	20·70	1135·35	28·42	

* Newcastle first occupied.

The last 20 years have been selected to enable a fair average comparison to be made with the 20 years ending in 1836.

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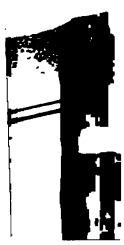

ADMISSIONS and Deaths from Fevers in the White Troops in Jamaica from 1838 to 1867.

Year.	Strength.	Fevers.		Ratio per 1,000 of Admissions to Annual Mean Strength.	Ratio per 1,000 of Deaths to Annual Mean Strength.	Remarks.
		Admitted.	Died.			
1838–39	2,521	1,865	83	747·71	33·32	
1839–40	1,994	1,428	96	713·60	48·13	
1840–41	1,553	1,109	117	714·74	75·40	
1841–42*	1,153	1,278	263	1107·49	228·29	
1842–43	1,360	..	19	..	13·00	No record.
1843–44	1,493	289	7	214·00	4·08	
1844–45	1,345	257	8	181·78	5·94	
1845–46	1,241	..	8	..	6·44	No record.
1846–47	1,181	176	8	147·00	6·72	
1847–48	724	160	6	220·99	8·28	
1848–49	731	234	12	320·10	16·41	
1849–50	746	158	2	213·13	2·60	
1850–51	756	183	4	243·38	5·29	Cholera epidemic.
1851–52	..	..	..	..	..	Cholera epidemic.†
1852–53	756	146	5	193·12	6·61	2 cases of yellow fever at Newcastle; 20 others elsewhere.
1853–54	839	210	36	274·13	44·10	
1854–55	833	101	1	121·24	1·20	
1855–56	714	167	2	240·00	2·60	Epidemic of yellow fever at Newcastle and island generally.
1856–57	714	256	71	358·54	99·43	6 cases yellow fever Royal Artillery sent to Newcastle. No cases after.
1857–58	555	67	6	120·07	10·80	
1858–59	627	103	..	164·26	..	
1859–60	621	59	2	95·00	3 22	
1860 ..	594	86	7	144·80	11·78	1st 14th Regiment arrived this year.
1861 ..	636	111	2	173·15	3·14	
1862 ..	702	60	4	84·14	5·60	
1863 ..	650	129	2	197·15	3·08	
1864 ..	677	120	..	176·12	..	
1865 ..	683	281	9	409·24	13·18	1 yellow fever at Port Royal; 2 ditto Up Park Camp.
1866 ..	735	338	5	460·00	6·80	
1867 ..	788	394	44	500·00	55·53	Epidemic of yellow ever in island.
Total ..	13,357	3,203	214	4487·57	291·37	
Average.	703	168·57	11·26	236·19	15·33	

* Newcastle first occupied. † No record for this year.

The last 20 have been selected to enable a fair average comparison to be made with the 20 years ending 1836. See Tables Nos. 1 and 2.

APPENDIX No. IV.

REPORT ON HYGIENE FOR 1868.

By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School.

Owing to circumstances I have been obliged to make this record of the chief points in Hygiene, which have attracted attention during the last year, rather shorter than usual. The following are the topics:—

1. Enumeration of Works on Military Hygiene.
2. Air.
3. Water.
4. Food.
5. Removal of Sewage.
6. Construction of Barracks.

Enumeration of some of the chief Works on Military Hygiene.

Although the military medical publications of Germany are very numerous and of the highest order of merit, there has hitherto been no complete work on Military Hygiene. The want has now been supplied by Dr. Kirchner.* It is an elaborate work, consisting of 445 closely printed pages, and deals very carefully and fully with every subject. The author is very perfectly acquainted with English writings, and has drawn many examples and illustrations from our official documents.

A very able address on the conditions of health during army service has been published by Dr. Roth†, in which the general principles of Army Hygiene are briefly and clearly stated. The same writer has also written an interesting account of the expedition to Abyssinia,‡ made up partly from English documents, partly from the Reports made to the Prussian Government by the German Officers who accompanied the expedition.

Dr. Heyfelder's account of the Russian Camp at Krasnoe-Selo has been translated into German; § it contains also a notice of the French Camp at Chalons.

The Indian Sanitary Reports for 1867 are as usual of the highest interest, particularly the Bengal Report, by Dr. Cuningham, which contains a full account of the great cholera outbreak at Hurdwar, to which reference is made hereafter.

Air.

A work has been published by Dr. Trautman,‖ of some interest. He has examined the air of inhabited rooms, by condensing the watery vapour, and he finds in this water numerous small cells, which he designates "decomposition cells." He states that he has convinced himself that the so-called fungi occurring in cholera discharges are quite the same as the cells found in other

* "Lehrbuch der Militär-Hygiene," von Dr. C. Kirchner, Kön. Preussischer Stabsarzt. Erlangen 1869.

† "Die Aufgaben des Armee-Gesundheitsdienstes," von Dr. W. Roth, Kön. Preussischer Ober-Stabsarzt. Berlin 1869.

‡ "Der Gesundheitsdienst bei der englischen Expedition nach Abessinien," von Dr. W. Roth. Berlin 1868.

§ "Das Lager auf der Krasnoe-Selo," von C. Heyfelder. An abstract of this paper, by Mr. Borchert of the Army Medical School, will be found in another part of this report.

‖ "Die Zersetzungs-Gase als Ursache zur Weiterverbreitung der Cholera," von Dr. Trautman. Halle 1869.

healthy or abnormal evacuations, and which also occur in all decomposition processes. He can, therefore, not admit a specific contagium in the cholera fungi. The cells which are thus found in all cases when decomposition is going on, are, according to Trautman, the same as those named Zoogloea, or Bacteria, or Vibrio, and classed by Nägeli and De Bary under the head of "Schizomyceten," as distinguished from true fungi. He believes he has traced the transition from vibriones into bacteria.

These co-called "decomposition cells" are described minutely by Trautman as obtained by him in putrescible fluids, and in the air; he has particularly studied them in urine. There they appear first as fine black points; then get clear in the centre, and attain a variable size; at first round and motionless they become oval, and movement begins; no cilia or other means of movement can be detected; then the oval cell divides in the centre, showing two round cells (the movement being at that time particularly lively), so that a two-celled form like a figure of 8 is produced. The cells then again elongate, again divide in the centre, and thus form rows or chains of cells, which are in some way connected, perhaps by a slimy mass; in fact, the cell-rows, called "vibriones," by Dujardin, are produced. They have an undulatory movement, which is slowest in the long rows of cells, but is often slow also in the short chains of cells, which are ceasing to have the power of dividing. The cells finally elongate, cease to move, the place of division is lost, and in this way arise the so-called "bacteridia."

Trautman goes on to describe the changes in the cells, and the formation of very fine threads, from the disappearance of the spaces between the cells; these threads are capable of dividing, and of forming round cells. All these successive stages are minutely described and figured.

Cells similar to those occurring in the urine exist, according to Trautman, in inconceivable numbers everywhere, if air, moisture, warmth, and organic substances are present. In the atmosphere, in dust, from the corners of a room, or even between the leaves of a book, they are easily found. In a room they give the peculiar smell familiar to us in ill-ventilated inhabited rooms. In his description here he agrees very closely with Lemaire, although he does not agree with this observer in his method of interpretation. In the atmosphere the cells exist as extremely fine punctiform molecules; when they come into contact with fluid, they begin to grow, especially if the temperature is warm. As to the existence of such cells in the atmosphere there is little doubt, but with regard to their connection with the cells in putrescible fluids, much uncertainty must be allowed to exist, and Trautman's facts do not seem very complete on this point. He appears to entertain no doubt of the identity of the urinary and atmospheric cells; but it would seem very questionable whether the character he gives, and the mode of growth, are sufficient to prove this. We all know how very similar, and apparently identical, many really different organisms are, in certain stages of their growth, and it would certainly seem necessary to bring forward more complete proof of identity than appears to be given in this work.

Chlorine gas entirely arrested the cell-division and growth in urine. Sulphuretted hydrogen gas greatly increased the growth.

With respect especially to cholera discharges, which were examined as soon as possible after they were passed (generally at once, only seldom after one hour, and only in two cases after four hours), Trautman always found the cells, which were often dividing and in movement. The great difference between cholera and other cases seemed to be that the growth of the cells was more advanced, and appeared to be more rapid. When the attack was passing off, and the discharges had become fœculent, the cells disappeared. He could not satisfy himself that in cholera the cells attacked the epithelium of the intestines. Trautman found precisely similar cells in the evacuations of typhoid fever, dysentery, and intestinal catarrh, and in medicinal diarrhœa. He considers that in cholera the cells do not stand in a primary, but in a secondary, relation to the disease. There is, however, something in cholera which accelerates their growth; he believes this may be the presence of some gases in the intestines (caused by the cholera process), which may aid the growth of the cells; but he brings forward no direct evidence of this.

As far as can be seen, Trautman has not attempted any cultivation-experi-

ments, after the manner of De Bary, or Hallier, so that really the nature and affinities of the cholera "decomposition cells" are left quite undetermined.

A considerable number of experiments on "disinfection," *i.e.*, on the destruction of the ærial and cholera cells are given, and numerous experiments with the "Süvern" disinfecting agency, (viz., lime, coal-tar, and chloride of magnesum are narrated.

The chief defect in this treatise seems to be that the investigation is left incomplete; accepting the facts, they show the existence, and probably the growth in impure air of these "decomposition cells," or whatever they may be called; but their development into moving vibriones, and the conversion of these into bacteria does not seem to be proved. Still it is a suggestive treatise, and shows how much remains still to be done in the investigation of floating bodies in the air.

Water.

Analysis of Water.

In last year's Report, the singularly beautiful method of analysis proposed by Dr. Frankland was noticed, and some of the difficulties in the way of its adoption, and the mode of stating the results, were considered. A warm debate has taken place on this matter at the meeting of the Society of the Metropolitan Officers of Health.* The general course of the discussion has passed very much over the ground taken up in my Report last year, and I believe the conclusions come to in that Report are substantially confirmed. The accuracy of Dr. Frankland's process in skilful hands was admitted by some, and doubted by others; its difficulty was not disguised, and it seems impossible that it should come into common use among medical men, at least in its present shape. The plan of expressing the amount of nitrogen (oxidised and organic) in terms of average London sewage, and the phrase, "previous sewage contamination," as indicated by the oxidised nitrogen, met with general disapproval. At the same time the old plans of analysis of water were much criticised by several of the chemical speakers, and in the comments in some of the medical papers, which are evidently written by chemists, the condemnation passed on them is unreserved.

At the present moment matters have been brought to such a pass, that if a question of water analysis came before a Court of Law, hardly any chemical point could be raised on which a chemist might not be called on either side. This is certainly unfortunate, and shakes the confidence of the public in hygienic water analysis. It is also, I believe, really unnecessary, for surely a general concurrence of opinion might be brought about, as to when a water is fit for drinking. In determining that point the processes should be trustworthy, but they should not be excessively subtle and minute. For if so, they may do harm by rendering the examination of water less frequent. I feel no doubt that (with one or two exceptions, presently to be considered) a very safe opinion can be given of the hygienic properties of a water by the combination of a few simple chemical and microscopical tests.

The chemists have almost universally decided against the incineration plan, and the employment of permanganate of potassium. The incineration test appears to have been chiefly regarded in respect of the difference in weight before and after incineration. It is affirmed, and no doubt with truth, that the results in the case of the same water are inconstant, and Dr. Frankland sometimes found, after recarbonating, that the weight was increased, instead of lessened, by incineration. As far as I have seen, this chiefly occurs in the chalk waters, and when the volatile substances are small in quantity (under 2 grains per gallon). But the difficulty of drawing a conclusion is not, I think, so great as is stated, for the mere fact of the incinerated sediment of a water remaining equal in weight to the total sediment, or regaining weight from recarbonating, is itself a valuable indication that such a water cannot be rich in organic matter. When the difference before and after incineration is considerable, that is again a valuable evidence in connection with other tests, and as far as I have been able to see, successive experiments on the same water give fairly accordant results, except in the case of the chalk

* See especially "The Medical Times and Gazette," May 1st and 8th, 1869.

waters, and even in that case, the errors are not great. Then again, during the process of incineration, other evidence of importance can be obtained. The amount of blackening; the rapidity or slowness with which the blackening disappears; the peculiar smell given off by organic matters; the possible formation of nitrous acid fumes acting on potassic iodide and starch paper, are all important points giving negative or positive evidence of great value in an hygienic point of view. I believe the test by incineration has been looked at in too restricted a point of view by those who reject it; they have regarded it too exclusively as a quantitative, and not as also a qualitative test. It certainly does give us hygienic information of value, why, then, should we not use it? why should we refuse to receive any of the evidence it can give, because it cannot give all we might desire?

So, also, in respect of the potassic permanganate test. Here is an agent easily used, giving fairly uniform results, and telling us with precision of the existence, and in a certain way, of the amount of oxidisable substances in water. Because it cannot tell us anything about non-oxidisable matters, is that any reason for not using the information which is attainable? Taken in connection with the qualitative and quantitative tests for nitrites, nitrates, ammonia, chlorine, phosphoric acid, sulphuretted hydrogen and ferrous salts, and with the results of incineration, it really does enable us to say whether a water contains much or little oxidisable organic matters. That is no slight information; and the value of the test is augmented by the fact that it is easily and rapidly used. No doubt it is an imperfect test, and it may eventually be superseded; but what can at present take its place? Can Dr. Frankland's process? Independent of the difficulty of his method,—of the immense errors which may be produced by imperfect manipulation (and over which there is no control, as in the case of the permanganate process),—how are its results to be interpreted? As long as Dr. Frankland could use the phrase "average London sewage," he had a logical standard of reference; if he surrenders this phrase, he has none; and yet he can hardly maintain it. Professor Wanklyn's plan, again, is easy and delicate; it will probably be a valuable adjunct to the usual processes, and I believe he would have increased its value, had he also introduced the common permanganate test into his system. But the exact value of the indications given by the distillation with permanganate is still *sub judice*, and at present at any rate we are not certain of the interpretation of the results.*

If an Officer of Health cannot adopt Frankland's process from want of time or skill, and from an uncertainty how to interpret the results, and does not feel at present sure of the exact value of Wanklyn's ammonia determination, and is yet averse to the use of the common potassic permanganate plan and incineration, on account of the objections raised to them by some chemists, what is he to do? Must he give up all hope of being able to come to a reliable opinion on the fitness of a water for drinking? Surely we need not acquiesce in such a conclusion. As I said in last year's Report, I believe it will be a most unfortunate thing if confidence is shaken in the usual plans of analysis, which, imperfect as they are, still enable us to say whether a water should be used or not.

Since the last Report, Professor Wanklyn and Mr. Chapman have published their work on "Water Analysis." As I have extracted the material part for the third edition of the "Manual of Hygiene," I will not go into details here.

I alluded above to the possible exceptions to the value of the chemical and microscopical enquiries. If it be true that the poison of cholera or of typhoid fever may exist in such minute quantities in water as to be indetectible by chemistry, then we could never pronounce any water to be safe; and the only plan would be during cholera epidemics to exclude all water which by any possible chance might be contaminated.

But we are really in complete ignorance on this point, and it would be wrong to prejudge the case. It may be that the cholera poison must always exist in some appreciable quantity, or, on the other hand, the minutest portion, which no chemistry can detect, may be fatal. At the present time, it is

* Since this was written, Dr. Angus Smith has written a valuable paper on the permanganate of potassium, as commonly used, and the employment of which he still advocates ("Chemical News," June 12th and 19th).

useless to discuss the point, for there is no evidence, except that the water may be tasteless (as in the case of the Broad Street pump), or may be foul tasted (as in the case of the outbreak on board the Southampton steamer in 1866).

The ova of entozoa in small numbers, again, might certainly escape detection, because, although they might pass under the microscope, yet it might require a very long examination to be certain that none existed. Here, however, the water would probably show chemical evidence of sewage contamination, and then it would be very carefully examined with the microscope, or would be condemned. There might certainly be cases in which ova would escape detection, but these would be rare.

On the whole, I believe the public may be satisfied that water can be sufficiently examined to enable a reliable opinion of its potable qualities to be formed.

Diseases produced by Water.

Malarious Fevers and Dysentery.—Dr. Blanc, in his Papers on Abyssinia,* describes the journey from Massowah to the highlands. The drinking-water for about 319 miles journey was found to be altogether bad. Dr. Blanc states that Mr. Prideaux and himself did not touch a drop of water except in the form of tea, coffee, or chocolate; they enjoyed perfect health. Mr. Rassam was less strict, and suffered from fever, after which he was more careful, and subsequently, as I infer, escaped. The native servants, for the most part, took very little care of the water, drinking all sorts; they suffered much from fever and dysentery, especially those who neglected all precautions. Dr. Blanc has no doubt that "the water supply is the most important question for all travellers."

Cholera from Water Poisoning.—Although the views of Snow and his followers have made great progress in this country, it has not been so on the continent. Comparatively few instances of the production of cholera by water have been reported, and several of the most eminent investigators have expressed themselves very doubtfully on the point. An able paper, by Dr. Ballot, of Rotterdam,† on Cholera in Holland, comes very opportunely. Dr. Ballot has no doubt that the theory of the propagation of cholera by water is the most applicable to his country. The "*genius epidemicus*, that *Deus ex machina* proved insufficient." In 1866 the mortality was 55 in 10,000 inhabitants, while in England it was only 6 in 10,000. In Utrecht the mortality was no less than 274 in 10,000, while in East London it was only 72 in 10,000. The following striking case occurred in 1866:—Dr. Snellen noticed that in a block of houses, inhabited by 107 persons, 32 persons, or 30 per cent. of the population, were attacked, and 23 died; while in the whole town only 4 per cent. of population were attacked. Those houses were not badly built; they had light and fresh air on two sides, nor were they inhabited by a poor class. At the back of the houses is a common yard, along the houses is a foot-pavement, in the yard are seven privies, all running off into a ditch, and then into the canal. Two wells, with wooden pumps, supplied clear and drinkable water. The foot-pavement was full of holes, in which foul water collected. The effects of the first cholera patient—bedclothes, ewers, and pots, were aired and cleaned on this pavement. On enquiry, it was found that the wooden pumps were worm-eaten at the lower end. Between June 11 and July 6 there were, as already said, 32 cases among 107 persons. On July 4th and 5th the pumps were repaired, and from that time cholera entirely disappeared, though it continued to prevail in Utrecht till the autumn. Close to this block of houses was a charitable institution, inhabited by 200 persons; of those, only one died of cholera, and that one had drunk water from the above-mentioned pump. The actual passage of excrementitial matters was not proved in this case, but it was probable in the highest degree, indeed almost certain.

Rotterdam is well known to be one of the places where cholera at once appears when any neighbouring point has been attacked, and from it cholera spreads to countries in commercial relations with it. We have received cholera two or three times from Rotterdam. Dr. Ballot points out what

* "British Medical Journal," April 1869.

† "Medical Times and Gazette," May 1st, 1869.

number of strangers are constantly arriving, and that all the sewage matters pass into the canal, and then percolate into the wells. The inhabitants drink both canal and well water, but in either case it is water impregnated with sewage; the whole soil is saturated with excreta. During the last 37 years numerous sanitary improvements have been made, but Rotterdam is as severely affected by cholera as ever. Why? The water supply is the only thing which has remained unimproved.

The two provinces in Holland which were least affected with cholera were Zeeland, where only one died in 700 of population, and Friesland, where one in 626 died. Neither place is particularly healthy; Zeeland in particular is very marshy. The cause of the slightness of cholera and of the fact that in the vast epidemic of 1866 only 4 cases of cholera occurred in the three largest towns of Zeeland,—viz., Middleburg, Flushing, and Zierikzee,—can be ascribed only to the water. In Zeeland only rain water is drank, because the water from ground or rivers and canals is brackish. In Friesland, from the same cause, most inhabitants drink only rain water.

An instance of the non-occurrence of cholera from altered water supply is given by Harlem. In 1849 cholera prevailed. In 1866 it returned, and prevailed again in the same degree, except in one quarter of the town where there was not a single case. What was the cause? That quarter was chiefly inhabited by bleachers, who require pure water for their business. They had between the two epidemics contracted for pure water from the downs and used it for drinking. They escaped without a case, while their neighbours died as before. Dr. Ballot finally concludes, that Holland is chiefly affected in those parts where the people drink water directly from the rivers and canals, or from wells contaminated with sewage: that in places where rain water is usually drank the disease is by far less violent; that places where there is no other drinkable water but rain water are not affected, the single cases which there occur being imported; that when pure water is supplied cholera disappears.

The Outbreak of Cholera at Hurdwar.

In the fourth Annual Report of the Sanitary Commissioner with the Government of India (Calcutta 1868, p. 20), a very interesting account is given of the great assemblage of pilgrims at Hurdwar in April 1867, and of the outbreak of cholera which appeared almost at the same time in the various parties of pilgrims as they dispersed after the sacred bathing in, and drinking, the water of the Ganges. The evidence given by Dr. Cutliffe, who was at the great fair of Hurdwar, and by Dr. Cuningham, who traced the transport of the disease by the pilgrims over almost the whole of North-West India, seems irresistibly to lead to the conclusion that it was a case of cholera water-poisoning on a gigantic scale. The main facts are these. Towards the middle of March 1867, parties of pilgrims began to arrive at Hurdwar to bathe in the Ganges as it debouches from the hills. This was one of the great gatherings which takes place about every 12th year, and by the 12th April it was calculated that 2,855,966 people were encamped on an area of 22 square miles. At noon on the 12th of April the bathing commenced, and in the evening of that day the pilgrims began to disperse, and spread all over the country in parties, proceeding to their homes. On the 14th the camp was almost deserted; on the 15th it was quite so. On the days following the dispersion, cholera broke out in bodies of pilgrims proceeding towards all points of the compass. The coincidence as to time, the occurrence of the disease in all directions, and in so many separate parties, proves that there was a common origin, and that must have been something connected with the camp.

In the camp the general sanitary arrangements were better than in former years; the surface conservancy was well attended to, and the dry earth system of latrines was introduced, except in a small section of the camp, where the excreta were burnt. These arrangements were made with great care, and there was an unusual absence of anything offensive in the camp. The cholera was therefore not generated by any insanitary conditions or sanitary arrangement, unless it was attributable to the imperfect burning of the excreta; but if so, the outbreak would probably have occurred at an earlier date.

The weather was a little unsettled, but there was nothing different from

former years till the 11th April, the day before the bathing, when there was very heavy rain, which continued during the whole night. This seems to dispose of Pettenkofer's hypothesis, for the ground water must have risen, and have rather prevented than assisted the evolution of any "germs" which may have found their way into the soil.

The rain was accompanied with a considerable fall of temperature, and the pilgrims were drenched. The soil, a loose sand and gravel, and in places marshy, was saturated with water; the sewage must have been washed out of the trenches, and the water of the Ganges and of the wells must have been contaminated. The Hindoos thought that some miasm followed the rain and spread through the camp, but of this there is no evidence. What is certain, is that the water was contaminated both in this way and by the bathing of the pilgrims the following day, and that every person in the camp drank of, as well as bathed in, this contaminated water.

Such a case as this must be judged of by analagous instances. The evidence cannot be brought home with the accuracy of a chemical experiment, but it only falls short of this. The contaminated water was taken on the 12th, the numerous outbreaks of cholera in different parties occurred on the 13th. It is quite true that any miasm produced by the rain might have acted in the same way, but it seems hardly reasonable to fall back on that hypothesis when we have those facts before us of undoubted impure water, of the fact of its being undoubtedly drank, and of the occurrence of numerous outbreaks in precisely the time subsequently which we should have anticipated.

It seems undoubted that though there had been no general outbreak before the dispersal of the pilgrims on the evening of the 12th April, yet that a few cases of cholera had occurred in the camp, and a party of pilgrims had entered it who had lost some of their companions on the road.

The full account of all these points, and of the undoubted transport of cholera over the North-West by the pilgrims returning home, is given very carefully by Dr. Cuningham, to whose able report I refer for fuller details than can be given here.

Food.

The Action of Extractum Carnis.

Dr. Kemmerich published in 1868* a short essay on the physiological action of *extractum carnis*, or rather of very strong meat broth, in which he asserted that when given in small quantity it increased the number and power of the heart's beats, but in greater quantity acted as a poison, and killed with symptoms of heart paralysis, and this action was ascribed especially to the salts of potash. In this respect he differed entirely from J. Rauke, who, in his celebrated essay on Tetanus, had ascribed the stimulating action of *extractum carnis* to the organic extractives. Liebig pointed out,† in reference to this paper, that Dr. Kemmerich had given to rabbits, which are not carnivorous, very large proportions of broth, and that it was not possible, from the experiments, to draw conclusions adverse to the use of the extract of meat. Dr. Kemmerich has now published a second paper,‡ containing all his experiments. He first made experiments on rabbits, introducing strong meat broth directly into the stomach; he found first the effect exciting, but it was followed by depression, and eventually by death, with failure of the heart's action, if the quantity of the broth was great. The decoction of about 2 to 3 lbs. of meat killed a strong rabbit in about 1½ hours. The pulse of the rabbit, ordinarily about 190 or 200 per minute, ran up to 400 or 430, and then became extremely weak, and was eventually lost altogether.

If the broth was given in small quantities, so that the exciting effect only was produced, there was no subsequent lessening in the number and force of the heart's beats.

Experiments on dogs were not so satisfactory, on account of the vomiting which was excited. Dr. Kemmerich then attempted to determine the cause of the primary exciting, and eventual poisonous action of strong broth on rabbits.

* Zeitsch. für die ges. Phys., Band I., p. 120.

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‡ Zeitsch. für die ges. Phys., Band II., p. 49, 1869.

He tried injections of kreatin in two cases without any perceptible action on the heart. He then injected the solution of the ash of broth, and found the same effects to be produced as when the broth itself was used. As the larger parts of the ash consists of potash salts, he then examined the action of chloride of potassium on rabbits and on men. As a further experiment he repeated the trials with chloride of sodium. He found the potassium chloride increase the frequency of the heart's action, but his experiments do not show (it appears to me) anything like the extraordinary influence of the broth. On men he also thought large doses of chloride of potassium (in three cases) and of nitrate of potash (in one case) raised the pulse, but as the mean rise was only $5\frac{3}{4}$ beats per minute, the change seems to me quite too inconsiderable to be put down to the assigned cause. In Traube's experiments (when potash salts were injected into the veins of dogs) this effect was not observed, and the heart was paralysed from the first. Dr. Kemmerich concludes that in small and moderate doses (15 to 30 grains) the "potash salts" (he only used, it may be noted, chloride of potassium and nitrate of potash) do not act as paralysers, but as excitants of the heart's action, though in larger doses they paralyse. The temperature of the body was not reduced.

With respect to the paralysing action of the large doses of the salts of potash on the heart, I think it should be known that Traube, Bernard, and Kemmerich, and others, were completely anticipated many years ago by Dr. James Blake, formerly of London, and now of California. In his paper presented to the Academy of Sciences, at Paris, and published in the Archives Générales de Médecine (Novembre 1839), the paralysing effect of potash on the heart was most clearly proved by the use of the hemadynamometer. In his paper in the "Edinburgh Medical and Surgical Journal," No. 139, he contrasts the effects of potash and soda very much as Kemmerich has done, only more completely, showing that the salts of soda did not impair the heart's contractibility (though the pulmonary circulation was interfered with), while the salts of potash acted most markedly on the heart. Again, in a paper read before the Royal Society in 1841, and published in the "Edinburgh Medical and Surgical Journal," No 148, he states that the salts of potass are the most fatal of all (except the barytic salts) to the action of the heart. It is, therefore, quite certain that though Dr. Blake's ingenious and numerous experiments have never been sufficiently noticed, he has completely anticipated all that has been stated of late years as to the paralysing influence of large doses of potash salts on the heart.

After deciding that the deleterious effects of large quantities of broth are owing to potash, Dr. Kemmerich proceeds to enquire into the nutritive worth of *extractum carnis*. He made a twofold experiment. He first exhausted meat thoroughly by water, so that nothing but a perfectly tasteless mass of fibres remained; to this he added the salts of flesh in proper proportion, and then fed two young dogs on this food; they throve capitally. This proves that the albuminous parts left behind, after the *extractum carnis* is gone, are nutritious, and are not, as Liebig reports, without any value. A remarkable modification of this experiment was made as follows:—Two young dogs were fed with the flesh left after extraction of everything soluble with water: one of the dogs had potash salts and chloride of sodium, the other only chloride of sodium. At the end of four weeks (on an equal nourishment of albuminates), the dog fed on albuminates and potash was no less than 1,160 grammes heavier than the soda-fed dog; and as at the beginning he was 115 grammes lighter, he had gained 1,275 grammes, or nearly $2\frac{1}{2}$ lbs. over the other dog. The conditions in the two dogs were now reversed: the dog which had had potash was now given soda, and the dog which had had soda had now potash given to him with the washed meat. At once the latter commenced rapidly to gain weight, while the formerly rapid growth of the first dog was checked, so that at the end of another 32 days he was actually 160 grammes lighter than the other. This shows how remarkably potash and muscular growth are related, as indeed has been already pointed out by Liebig.

Further experiments* showed, however, that the chloride of sodium was

* Another point came out in these experiments, viz., that the dog fed on soda and washed albuminate began to show signs of rickets.

not unimportant even for muscular growth, but was indeed indispensable, in order that the potash salts should act. In the words of Dr. Kemmerich,—
" When the chloride of sodium is withdrawn, the influence of the salts of meat
" on the growth of muscle does not occur. These observations give experi-
" mental proof that the addition of chloride of sodium to meat soups and meat
" extracts is not merely serviceable as an aid to taste and flavour, but is
" necessary, by the laws of nutrition, if the broth of meat is to reach its full
" and high value" (p. 83).

Dr. Kemmerich then examines further into the question, whether the potash salts can be taken as substitutes for soda salts; and he fed a dog on food from which chloride of sodium was carefully withdrawn. His experiments (not very complete in this direction) show that the potash salts do not take the place of the soda salts. The serum of the blood obstinately retained soda, so that when the body could obtain no fresh supply, though chloride of potassium was abundantly given, the serum of the blood contained still more than thirty times as much soda as potash, so that the potash had not replaced the soda.

After this discussion on the salts of the *extractum carnis*, Dr. Kemmerich returns to the question of the nutritional powers of Liebig's extract. As a converse to the experiments on the washed meat, he took two young dogs, eight weeks old, and to the lightest of these he gave only water; to the heavier, water and Liebig's extract. The weight of the latter dog fell much faster than that of the dog fed on water only, and the dog died on the 12th day; while the dog fed on water was alive, and, being then properly fed, recovered.

This proves that for dogs, Liebig's extract, *by itself*, is not a food; but of course it says nothing against the nutritive powers of the extract when properly combined with other foods; and it is in the highest degree important that this experiment of Dr. Kemmerich should not be misinterpreted, and should not be cited as an argument against Liebig's food; for if so, on the same principle meat might be said not to be nutritious for men, for men cannot be kept alive on a diet of meat alone.

To sum up Dr. Kemmerich's conclusions. The principal nutritional agency in the extract of meat is, he believes, the potash salts; but a little action of the organic extractive matter is, he says, " by no means excluded." But as the effect of the extract, on the whole, hardly surpasses that of the salts of the extract by themselves, either the unknown extractive matters have no exciting effect on the nerves, or these matters exist in so small a quantity that their action is not manifest; but as a flavouring agency he looks upon the extract as very important.

On this point it may be observed that Kemmerich's experiments seem far too few and on too narrow a basis to warrant his speaking with so much positiveness. He has made no experiments on men, and very few on dogs. Admitting the accuracy of his experiments, and of the conclusions legitimately to be drawn from them, we cannot concede that he has shown in any way, that, when given in proper combination, it has been proved that the nitrogen of Liebig's extract may not be applied to the repair of the nitrogenous tissues.

I admit that the experiments on men are not numerous, but as far as they have gone they seem to show that the extract may take the place of a nitrogenous aliment. At any rate it is of the highest importance that the contrary should not be affirmed, except on sufficient experimental evidence.

With regard to the possibility of poisonous effects being produced by the potash salts in Liebig's extract, Dr. Kemmerich does not believe that, under ordinary circumstances, the use of the extract is likely to be attended with injury, but he believes that in weakly or young persons a potash poisoning, leading to paralysis of the heart, might be induced; but he states this, he says, not to attempt to restrict the use of the *extractum carnis*, but only to call to mind the possibility of the potash salts producing untoward symptoms; and he advises, in order that the true value of the extract shall be obtained, that it shall be given in small and frequently repeated doses, and this in the ratio of the youth and weakness of the patient. In this way he believes the nourishing influence of the potash salts on the muscles will be obtained, and the paralyzing effects avoided.

It may be worth while here to note especially the quantity of potash salts in

Liebig's extract. It must be remembered that chloride of sodium is added during the preparation, so that in some analyses the soda salts largely preponderate over the potash; but taking the largest proportion of potash salts, and estimating the amount as 90 per cent. of the soluble salts (which is really too high for the commercial article), then if these soluble salts have an amount of 17 grains in 100 of extract, or 74 grains in one ounce, the potash salts will be 66 grains in an ounce of extract. These salts are composed chiefly of chloride of potassium and phosphate of potassium, so that the quantity of potass (if we express it in that way, and suppose the two salts to be in equal quantities) would certainly not be more than 32 grains per ounce. This is in fact more than usually exists. In fact in one analysis I found the potash to be only 9 grains in an ounce of extract. But taking the larger number, then, as in ordinary nutritions a man takes in and parts with, every day, about 40 grains of potash, and as in sickness he will receive little potash, except perhaps in the extract, it seems hardly possible, unless enormous quantities are given, that Kemmerich's fears about potash poisoning from this source should be real. We must remember also that in man constant elimination goes on (far more than would have been the case in his rabbits), and thus potash would be constantly removed; and when we observe what a powerfully good effect even his experiments show to be produced on muscular nutrition and action by the potash salts, and how necessary it is to ensure this effect in disease, any expression of opinion which tends to shake confidence in the *extractum carnis* must be carefully criticised.

There is no doubt that when given to sick, and even to healthy persons in very large quantities, the *extractum carnis* does sometimes produce a degree of malaise and, possibly, feverish symptoms. But though Kemmerich, and Rauke also (in the case of meat) attribute the symptoms to the potash, I rather question this. I have seen them produced and then removed, not by lessening the *extractum carnis*, but by adding other kinds of food,—viz., starches and fats. So that it seems to me questionable whether it was not the exclusive feeding with the extract,—*i.e.*, the relative excess,—that was to blame. At any rate, this possibility is not excluded by the experiments of Kemmerich.*

The Removal of Sewage.

The problems connected with the removal of the solid and fluid excreta remain much as they were; but another question, which all have foreseen must sooner or later be brought forward, is now under discussion.

In the case of both the two chief systems of sewage-removal,—viz., by water and by earth,—the excreta are finally applied to land; for although when water is used the sewage may still be poured into streams, the cessation of this practice is only a question of time, and in all inland places the sewage will be made to flow over land. At present the sewage irrigation has been attended with scarcely any evidence of bad effects being produced on health, and in the opinion of most persons there is no reason to fear any untoward result from this practice. But it must be remembered that we have not yet tried the disposal of cholera evacuations in this way, and that without asserting that the passage into the ground and the action of plants would not render these discharges innocuous, it must yet be conceded that there are two possibilities,—first, that the discharges might dry on the surface of the ground, and be then lifted and transported by wind,—as Dr. Budd supposes is the case in India; or that they

* Another argument against the potash poisoning theory is to be found in the want of such symptoms when enormous quantities of potash salts are given in medical practice. In acute rheumatism some physicians have kept the urine alkaline for days with bicarbonate, others have given immense and long-continued doses of nitre, and others have given equally large doses of acetate of potash. I do not for a moment deny the paralysing effect of large doses of potash on the heart in experiments on animals, but it certainly must require large quantities to produce this in men, and it seems hardly possible to agree with the explanation lately started in Germany, of the action of tartar emetic, that it owes its effects in great measure to the small quantity of potash it contains.

might pass into the ground and there find the conditions of growth, according to Pettenkofer's hypothesis.

In the absence of any evidence at all on either of these points, it might seem inadvisable to raise a question which cannot be answered; but yet the subject is one of such deep interest that it ought not to be overlooked.

Again, we have some evidence of diarrhœa being produced by the emanations of ground irrigated with sewage, and attention has again been directed to this point by a paper by Dr. Clouston. Some years ago an epidemic of dysentery and diarrhœa occurred in the Cumberland Asylum, which seemed to be traced to emanations from a field of stiff clay over which the sewage of the asylum passed. The sewage was consequently taken into a brook, and for two years, while thus disposed of, the asylum was free from dysentery or diarrhœa. But the plan of land sewage irrigation being again resumed in the same manner as before, dysentery and diarrhœa re-appeared in the asylum, although carbolic acid was used to prevent decomposition. The case is certainly very striking, and were it not for the numerous negative instances, would be quite convincing. Even as it is, it seems difficult to find a flaw in the evidence, or justification for doubt.

On the other hand, the possible dangers arising from the dry earth system are attracting attention. Of course it is assumed that the earth system is properly carried out, that the earth is in proper quantity, and that the discharges are thoroughly covered and mixed. But even if this is done, and even if deodorization is complete, it is feared that disinfection will not be so, and that the influence of cholera or typhoid discharges may actually be augmented by the treatment they thus receive. The opinions of Pettenkofer are, of course, very decided on this point. The addition of earth to cholera or to typhoid discharges would, in his view, be the best means of preserving and augmenting the activity of those discharges.

Here, in fact, we have the speculations of the philosopher influencing the habits of nations. If Pettenkofer's opinions be right, the earth system would have a dangerous flaw. Professor Rolleston* has lately directed attention to this point, and has expressed on this and other grounds grave doubts of the advisability of the dry earth system, except in exceptional cases.

There is no doubt that if Pettenkofer's views be admitted, the opinion expressed by Dr. Rolleston is a sound one; but the difficulty is to know how far we can rely on Pettenkofer's ground theory of cholera and typhoid fever. It seems almost certain that it fails materially as an universal explanation of the spread of cholera; and the fact that Pettenkofer has been compelled to deny the water origin of cholera, shows to what straits of argument he is driven. But even if Pettenkofer be not correct,—even if the passage into the earth is not a necessity for development, it is probable that earth does not disinfect cholera. The evidence of foul camps in India is not very good, for in them the discharges are scattered over the ground; but in the Hurdwar outbreak the earth system did not prevent the development of the disease. Whichever explanation of that outbreak is chosen,—water poison or aerial nuisance,—the fact remains that the discharges were not rendered innocuous by earth. The danger, therefore, of cholera discharges mixed with earth remaining about our houses cannot be held to be altogether imaginary. With respect to typhoid fever, nothing certain is known. The whole question seems to me to be deficient in evidence one way or the other, and to be a problem for future rather than for present decision. At the same time it must be said that the danger is not confined to the earth system, but might equally be charged on the water-removal plan when the sewage is passed over earth.†

* "Lancet," March 6th, 1869.

† There are two points noted in the discussion lately raised on this point, which seem to me a little uncertain. First, as to the connection of the fever in the Bengal gaols and the earth system. As far as I understand the question it is this—A fever (of relapsing character) prevails in the North-West Provinces, and particularly in the gaols. In the opinion of the majority of Medical Officers it is a highly contagious disease, is introduced by prisoners, and is perfectly kept at bay by isolation and proper quarantine; the evidence for this view seems quite certain. It is not typhoid fever, and is not admitted to be connected with fœcal excreta. Dr. Mouat has, however, argued that this fever is like typhoid fever, dependent on

The Oxidization of Sewage in Streams.

At the debate before the Society of the Metropolitan Officers of Health much difference of opinion was expressed as to the degree and rapidity of oxidation of sewage matters passing into a body of flowing water. Dr. Letheby considers that the purifying effect of oxidation, and the assimilating power of plants is so great that a body of water will speedily purify itself, independent even, as I understand, of the additional purifying aid from deposition. He gave evidence of this derived from his own observation and from experiments by Dr. Angus Smith. On the other hand, Dr. Frankland, without denying oxidation in streams, expressed an opinion that the amount was limited and the oxidation slow, and believed that it would be unsafe to rely on natural purification. On such a point as this, where it comes to be a degree of more or less, and where the volume of water, its movement and aëration, the amount of water-plants, and other conditions, must have so great an effect, it is vain to expect any unanimity of opinion without a much greater series of experiments. But without this, Dr. Frankland's opinion is that which commends itself to us in a hygienic point of view. It is far better to under-rate than to over-rate the action of a purifying cause. Common sense tells us that sewage, if there is any chance of its not being oxidized, is a danger, and one must act on the probability of that chance. Besides, as Dr. Ballot* well pointed out, ova and larvæ, and possibly the outpourings from diseased surfaces which retain some form, may not, and indeed in some cases will not be oxidized. When epithelium is found in such a body of water as the Thames at Teddington, at the very place where the water companies take their supply, it may well make us hesitate before we can admit that the purifying effect of oxidation in a running stream is an agency which we can put much trust in. There will always be the chance that it will not act, and that chance may produce some dangerous results.

Construction of Temporary Barracks and Hospitals.

The following ingenious plan for the rapid construction of barracks has been published by a Russian Officer.† Count Wollowicz has been so kind as to give me the following account of this plan :—

Captain Pilz, of the Russian Engineers, on considering the insufficiency in some cases, and the enormous expenses, combined with the same inefficiency of construction, and the number of the temporary military hospitals (facts, as he remarks, sufficiently proved in the last disastrous wars), has been led to propose a new plan of building temporary military hospitals and barracks.

Captain Pilz says that his plan answers the following requirements :—

1. The material for building is simple, and is to be found everywhere (of

decomposing ordure, and believes that the proper way of arresting it is not quarantine, but the thorough carrying out of the earth plan of treating sewage, when he presumes the earth will disinfect, and the fever will disappear. To this it is replied that the fever has appeared in the Punjab gaols in spite of the most thorough deodorization of excreta by earth, and it is argued from all the circumstances of its spread, not that the earth has failed to disinfect, but that the fever is of a different origin altogether, has other means of propagation, and will be totally uninfluenced by any measures based on the idea that it is connected with fœcal decomposition. It is evident that this case affords no argument against the earth system, as there is no evidence that the goal fever is propagated by the intestinal discharges, and the appearance of the fever in a gaol is no proof that the earth has not disinfected, because there was really nothing to disinfect. As regards the second point raised in this discussion, viz., the presumed effect of the earth closets at Wimbledon last July in causing diarrhœa, it may be noted that the drinking water was possibly more to blame; some was sent to Netley to be examined, and was found to be impure. Probably, also, as stated by one writer, the food and the various drinks sold in the camp may have been also to blame. At any rate the diarrhœa attacks do not seem to have been brought home to the earth closets with sufficient evidence.

* "Medical Times and Gazette." May 8th, 1868.

† The work is printed in the Russian Journal for Military Engineers, St. Petersburgh, 1868.

course he means, probably, northern latitudes—the material being boards of deal), is very easy of transport, and is very cheap.

2. The possibility of building without using professional carpenters. The method being so simple, as to allow every soldier or common workman to execute it.

3. It has the advantage, that the material used can be taken into work at once in such state as it happens to be found in commerce, *i.e.*, without special preparations, which increase the expenses.

4. The cheapness of this plan of building, from the possibility of avoiding all metallic joining means, as nails, etc.

5. Possibility of changing a temporary hospital, which was intended for summer into one for winter, without disturbing the in-patients, and without difficulty and increased fresh expenses.

6. Possibility of having as many groups of independent buildings as required, connected together by corridors.

7. Facility with which ventilation and warming are carried out in such temporary barrack hospitals.

The plan is as follows :—

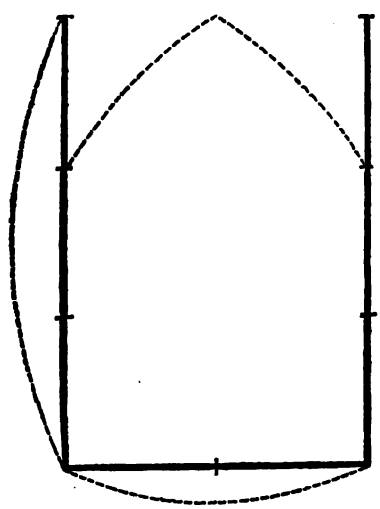
The material used are the planks of deal or boards of fir and pine, which are very easily transported, packed, and easily lifted upwards in building. Beams and other large pieces of timber are used only in very insignificant number, namely, on 7 feet length, 3 feet height, and 25 breadth of building, only three beams of 21 feet are used.

The boards used in these buildings are not previously prepared, but taken in their rough state. In changing a summer barrack into a winter one, a second or exterior row of exactly the same boards is put round the first wall. Rafters are made also of the planks of deal of 2½ inches in thickness.

In the whole building there is not a single iron joint, and even iron nails can be dispensed with, and replaced by wooden ones.

The whole construction of those temporary separate hospital barracks connected with each other by the means of corridors, is based on the possibility and readiness of bending to a certain degree different planks of deal and boards.

Two planks, 1 inch thick and 21 feet long, are fastened by their lower ends deeply in the earth, and distant from each other 14 feet, and if their upper ends are then bent so to meet one another, the section of the building will represent the figure. To make the walls less permeable to the damp and



wet, another row of planks can be put externally to the first, and tied together by vertical ties. It is to be understood that the breadth of the barrack built

by this plan cannot be variable. The best distance between the two walls is 14 feet.

Captain Pilz proposes to make the length 42 feet, and in such a hut he puts 15 beds, so that 200 sick would require only 14 such separate barracks, joined together by corridors. Division of such a temporary hospital for 200 sick will make one group of buildings united by corridors. The same kind of hospital for 400 will make two such groups, and for 600 three, and all those buildings are made out of exactly the same material, and all parts are of the same size.

Each barrack taken separately represents in the plan an oblong of 42 feet long and 14 feet broad. Each barrack taken as a ward for sick will contain 15 beds.

The corridors do not differ in their construction and manner of building from the barracks.

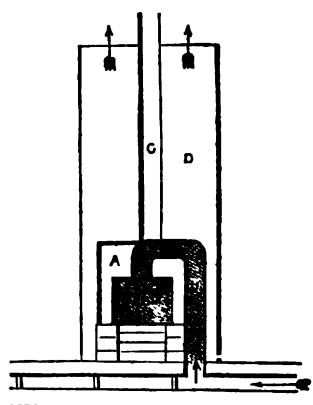
Ventilation and Warming.

1. In each barrack there are four windows, 4 feet 6 inches high, and 3 feet 3 inches broad, which makes $3{\cdot}3 \times 4{\cdot}6 \times 4 = 60\frac{3}{4}$ square feet.

2. Two openings in the ceilings, each of 6 feet length, and as much breadth, which will give $2 \times 6 \times 6 = 72$ square feet.

3. In all there are 288·5 square feet openings. In each barrack there are 15 sick, so every patient will have the maximum of outlets 15·2 square feet.

In winter the air is warmed by means of stoves. The stoves are metallic, surrounded by a 7-feet high iron screen, which prevents the too-powerful radiation of heat, and directs all the calorific rays towards the ceiling, where



being mixed with the external cold air, and warming it makes it descend down, and so on.

The floors are made double, with an interval between them, which is completely isolated from the external air. The outlets are in the floor, and this floor interval is in direct communication with the stove, and so a constant current is established, bringing the warmed air from the floor interval into the stove.

Experiments showed in Berlin, that even during the severest frosts this mode of warming is sufficient.

CLOTHING.

Coralline.—Much attention has been directed both in France and England to the effect of poisonous dyes used in under clothing. Drs. Tardieu and Roussin have recently published a memoir on "Coralline," a new dye discovered by M. Persoz, Jun., in 1860, and which produces very poisonous results.* The authors first relate eight cases of cutaneous eruptions (chiefly vesicular and erythematous in character), resulting from this dye.

Coralline, or peonine, is a derivative of rosolic acid, and which is itself pro-

* Ann. d'Hygiène, Avril 1869, p. 257.

duced by the oxidation of phenol (carbolic acid). The composition of coralline is not precisely known ; it is formed at a high temperature by the contact of rosolic acid and ammonia. The common coralline of commerce is, however, often a rosolate of soda. The so-called "yellow coralline" is merely rosolic acid. When an alcoholic solution of coralline is injected into the cellular tissue of animals, it produces diarrhœa and great depression, and violent inflammation at the point of injection. A middle-sized dog was killed by two injections of 2⅓ and 3 grains, two days being allowed to pass between the two injections. A rabbit was killed by 1½ grain. After death there was purulent infiltration at the point of injection, and acute inflammation of the intestines. The liver was fatty ; the lungs were deeply tinted, and coralline was detected in the lungs by the following plan :—the lungs were cut in pieces, carefully dried in the water-bath, and were then exhausted with pure alcohol, of a strength of 85 per cent. The filtered alcoholic liquids were evaporated to dryness, and the residue was re-dissolved in distilled water. A piece of silk was then placed in the water till it had nearly absorbed all colour. It was then washed and dried, and heated with warm alcohol, which dissolved all the colouring matter. This alcoholic solution, which was of a pretty red tint, was evaporated to dryness, and again re-dissolved in warm water, and another piece of silk being put in was again dyed. The coralline was therefore detected by these tinctorial properties.

In another experiment, when a rabbit was fed on carrots mixed with coralline, the hepatic fatty degeneration was even more marked ; and besides the lungs, the superficial layers of the bones were tinted with a red colour.

Tardieu concludes not only that coralline is an active poison when thus introduced, but that it may be absorbed by the skin.

Coralline may be recognised as follows :—It does not dissolve in cold water ; the colour is a little destroyed by boiling water, and is rapidly and completely so by boiling alcohol. Alkaline liquids do not alter the colour ; acids precipitate it in yellow flocks.

Aniline-red differs in the reactions from coralline in being decolourized by ammonia, but the colour is reinduced by the addition of an acid. Arsenic can also be detected in aniline-red. Arsenic acid can be detected sometimes in fuchsine by the fellowing simple plan :—Dissolve 15 grains of crystals of fuchsine in water ; add nitrate of silver in excess ; wash precipitate completely ; add a slight excess of nitric acid, and throw on a filter. Neutralize carefully with ammonia the liquid which passes through, and if arsenic acid has been present a brick-red precipitate of arseniate of silver will be produced.

Besides coralline and aniline-red, there are four other organic red dyes in use,—viz., madder, cochineal, murexide, and carthamine. Madder is not acted on by a solution of hydrochloric acid (3 or 4 per cent.), or by ammonia ; cochineal is turned violet by ammonia, and gives to the ammoniacal liquid a vivid violet colour ; murexide is blanched by citric acid ; and carthamine is completely decolorized by a short boiling with a weak solution of soap (¼ per cent).

APPENDIX No.V.

REPORT OF AN EXPERIMENTAL INVESTIGATION INTO THE VENTILATION OF THE NEW BARRACKS AT CHELSEA, AT PRESENT OCCUPIED BY THE COLDSTREAM GUARDS.

By F. De Chaumont, M.D., Staff-Surgeon, Assistant Professor of Hygiene, Army Medical School.

December 16 and 17, 1868.

These barracks, of great extent, are among the most recent constructions of the kind. The general plan is that of one large block, very long, but only one room in thickness, and four stories high. There is a basement gallery with open windows under the ground floor, originally intended as a shooting range. Through this there is a continual draught, which, though it may be pleasant enough on a hot summer day, makes the lower rooms very cold in winter. In each passage the rooms open from the stair-landing on the right and left, there being two rooms on each floor, with a lavatory and urinal for each, and a serjeant's quarter. The rooms are long, and contain generally 25 beds. The door is at the end, and there are windows on each side. The fire-place is in the middle of one side, and alternates in position right or left of the door in each successive floor. At the farthest end of the room is a place for a second fire-place, which has not been put in. The cubic space per man is about the regulation amount of 600 cubic feet.

Ventilators.

The ventilators are the following:—

1. Five *Sheringham valves*, three opposite, and one on each side of the fire-place; area of each, ·4 square foot = 2·0 square foot.

2. Galton's ventilating stove, with chimney ·4 square foot sectional area. Hot-air chamber, and louvred opening above fire-place, of usual pattern; available area of louvre = ·4 square foot; total sectional 2·8 square feet = 403·2 inches for 25 men = per man, 16·1 inches.

There is no *outlet shaft* at all.

The louvred opening from the air chamber for the second fire-place exists, but it is in most cases boarded up.

There are two gas-jets, but no special provision for carrying off the products of combustion.

Rooms selected.

The rooms selected for examination were in E passage,—viz.,—

No. 2 Ground Floor.
No. 3 1st „
No. 5 2nd „
No. 7 3rd „

One above the other in regular order. The fire-place was on the right hand in Nos. 2 and 5, and on the left in Nos. 3 and 7.

At midnight the following observations were made:—

External Air.

External Air:

Temperature, dry bulb	50°
„ wet „	48°
„ dew-point	45·9°
Humidity	86 per cent.

Wind, S.W., strong.

Carbonic acid experiment failed, so the average, ·400 per 1,000 vols., was adopted.

No. 2, ground

At 10 p.m., *No. 2 Ground Floor* was entered. There were 16 men in the room, who had not long finished smoking, so that any odour was obscured by the smell of tobacco. The observations were these:—

Temperature, dry bulb..	61°
„ wet „	54°
„ dew point	47·9°
Humidity	62 per cent.

*Movement of Air:**

Hot-air Louvre	+251 per min.
	= +6,024 cub. feet per hour.

Sheringham valves, all outlets:

1st windward side	−123 per min.
	= −2,952 cub. feet per hour.
2nd „	−113 per min.
	= −2,712 cub. feet per hour.
1st leeward side	−198·8 per min.
	= −4,771 cub. feet per hour.
2nd „	−81 per min.
	= −1,944 cub. feet per hour.
3rd „	−69 per min.
	= −1,636 cub. feet per hour.
Total by Sheringham valves	−14,025 cub. feet per hour.

Chimney on the right, or windward side of the room.—Fire alight, but low. Temperature, 94° F.

Rate	−876 feet per min.	
	= −21,038 cub. feet per hour.	
Total *delivery* of air	+6,024	„
Per man	+377	„
Total *discharge* of air	−35,063	„
Per man	−2,191	„

This last represented the gross apparent movement, and would give a carbonic acid ratio of ·674. The actual ratio was very near this:—

1st time	·607
2nd „	·710
Mean..	·658 per 1,000 vols.

or 64 per cent. excess above outer air.

From this we find the actual movement:—$\frac{\cdot 6}{\cdot 00658 - \cdot 0004}$ = 2,326 cubic feet per head per hour.†

This was about *four-fifths* of the proper amount of good ventilation.

The men in the ground-floor rooms complained of cold from the gallery below; and on examination, the boards were found to be open, particularly round the skirting, where a draught was coming up at the rate of 220 feet per minute. A little caulking would, of course, easily remedy this defect.

No. 3, 1st floor.

No. 3, First Floor.—At 10·30 P.M., there were 18 men in bed, and the smell was noted as "rather close."

Temperature—dry bulb	59°
„ wet „	52°
„ dew-point	45·8°
Humidity	61 per cent.

Movement of Air:

Hot-air Louvre	−116 feet per min.
	= −2,784 cub. feet per hour.

(On the leeward side of the room, and acting as an *outlet*).

---

* The sign + signifies delivery of air into an air space.
„ − „ discharge of air out of an air space.

† ·6 of a cubic foot is the average amount of CO_2 given off by an adult in 1 hour.

Sheringham valves—all acting as outlets:

1st, windward side	−114 per min. = −2,736 cub. feet per hour.
2nd „	nil.
3rd „	−85 per min. = −2,040 cub. feet per hour.
1st, leeward side	−78 per min. = −1,872 cub. feet per hour.
2nd „	−236 per min. = −5,664 cub. feet per hour.
Total by Sheringham valves	−12,312 „

Chimney—Temperature, 82° F.; fire out:

on leeward side of the room	−460 per min. = −11,040 cub. feet per hour.
Total *delivery* of air	nil.
„ *discharge* „	−26,136 cub. feet per hour.
Per man	−1,452 „

This would give a carbonic acid ratio of ·815 per 1,000 vols.; but the real ratio was much less.

1st time..	·687
2nd „	·682
Mean	·684 per 1,000 vols.

or 71 per cent. excess above the outer air.

From this we have the actual movement :— $\frac{\cdot 6}{\cdot 000684 - \cdot 0004} = 2{,}113$ cubic feet per head per hour, or about *two-thirds* of the proper quantity.

No. 5, Second Floor.—At 11 P.M., there were 17 men in bed, and the smell was "very perceptible." *No. 5, 2nd floor.*

Temperature—dry bulb	63° F.
„ wet „	54° F.
„ dew-point	48·7°
Humidity	66 per cent.

Movement of Air:

Hot-air Louvre	+210 per min. = +5,040 cub. feet per hour.

Sheringham valves—all as outlets:

1st, windward side	−129 per min. = −3,096 cub. feet per hour.
2nd „	−59 per min. = −1,416 cub. feet per hour.
1st, leeward side	−90 per min. = −2,160 cub. feet per hour.
2nd „	−232 per min. = −5,568 cub. feet per hour
3rd „	−128 per min. = −3,072 cub. feet per hour.
Total by Sheringham valves ..	−15,301 „

Chimney—temperature, 80° F.; fire out:

On windward side of the room	−550 per min.	
	=−13,200 cub. feet per hour.	
Total *delivery* of air	+5,040	„
Per man	+296	„
Total *discharge* of air	−28,231	„
Per man	−1,660	„

This would give a carbonic acid ratio of ·755 per 1,000 vols.; but the actual ratio was less,—viz. (a single observation), ·702 per 1,000 vols., or 75 per cent. excess over outer air.

From this we find the actual movement:—$\frac{\cdot 6}{\cdot 000702 - \cdot 0004}$ = 1,987 cubic feet per head per hour, or under *two-thirds* of the required amount.

No. 7, 3rd floor.

No. 7, Third Floor.—At midnight there were 21 men in the room, and the smell was noted as "very close."

Temperature—dry bulb	58° (59°)
„ wet „	54°
„ dew-point	50·4°
Humidity	76 per cent.

Movement of Air:

Hot-air Louvre	−94 per min.
	=−2,256 cub. feet per hour.

(On leeward side, and acted as an *outlet*).

Sheringham Valves—all as outlets:

1st, windward side	−96 per min.
	=−2,304 cub. feet per hour.
2nd „	nil.
3rd „	−107 per min.
	=−2,568 cub. feet per hour.
1st, leeward side	*variable.*
2nd „	−123 per min.
	=−2,952 cub. feet per hour.
Total by Sheringham valves	−7,824 „

Chimney—temperature, 84° F.; fire out:

On the leeward side of the room	−472 per min.
	=−11,328 cub. feet per hour.
Total *delivery* of air..	nil.
Total *discharge* of air	−21,408 cub. feet per hour.
Per man	−1,020 „

This would give a carbonic acid ratio of ·988; but the actual ratio was lower,—viz.:—

1st time	·708
2nd „	·741
Mean	·724 per 1,000 vols.

or 81 per cent. excess over the outer air.

From this we find the actual movement:—$\frac{\cdot 6}{\cdot 000724 - \cdot 0004}$ = 1,852 cubic feet per hour per man, or about *three-fifths* of the required amount.

SECOND SET OF EXPERIMENTS, FROM 1·30 TO 2·15 A.M., 17TH DECEMBER. *2nd set of experiments.*

No. 2, *Ground.*—Very little smell; the odour of tobacco had disappeared. *No. 2, ground.*

Temperature – dry bulb	58°
„ wet „	51°
„ dew-point	44·7°
Humidity	61 per cent.

Movement of Air:

Chimney .. .. −712 per min.
= −17,088 cub. feet per hour.

N.B. The number of other ventilators prevented any more detailed observations.

Carbonic Acid:

1st time	1·059 at farthest end of room.
2nd „	·496 at door.
Mean	·778 per 1,000 vols.

or 94 per cent. excess over the outer air.

From this we get the movement of air:—$\frac{\cdot 6}{\cdot 000778 - \cdot 004}$ = 1,586 cubic feet per head per hour.

Movement calculated by Montgolfier's formula = 2,251 cubic feet per head per hour.

If the above *mean* be correct, the quantity of air supplied was about *one-half* of the required amount.

No. 3, *First Floor*, at 1·45 A.M., 17th December.—Smell, "not close." *No. 3, 1st floor.*

Temperature—dry bulb	58°
„ wet „	52°
„ dew-point	46·6°
Humidity	66 per cent.

Movement of Air:

Chimney .. .. −413 per min.
= −9,912 cub. feet per hour.

Carbonic acid:

1st time	·680
2nd „	·734
Mean	·707 per 1,000 vols.

or 77 per cent. excess over outer air.

From this we find the movement of air:—$\frac{\cdot 6}{\cdot 000707 - 0004}$ = 1,954 cubic feet per head per hour, or about *two-thirds* of the amount necessary.

By Montgolfier's formula = 1,546 cubic feet per head per hour.

No. 5, *Second Floor*, at 2 A.M.—Smell noted as "close." *No. 5, 2nd floor.*

Temperature—dry bulb	58°
„ wet „	52°
„ dew-point	46·6°
Humidity	66 per cent.

Movement of Air:

Chimney .. .. −604 per min.
= −14,496 cub. feet per hour.

Carbonic acid :

1st time	·655
2nd „	·583
Mean	·619 per 1,000 vols.

or 55 per cent. excess over outer air.

From this we find the movement of air :— $\frac{\cdot 6}{\cdot 000619 - \cdot 0004}$ = 2,740 cubic feet per head per hour, or *nine-tenths* of the required amount.

Movement by Montgolfier's formula = 1,966 cubic feet per head per hour.

The excess probably due to the aspirating force of the breeze at the time.

No. 7, 3rd floor. *No. 7, Third Floor*, at 2·15 A.M.—"Very slight smell."

Temperature—dry bulb	58°
„ wet „	51°
„ dew-point	44·7°
Humidity	61 per cent.

Movement of Air :

Chimney..	—519 per min.
	= —12,456 cub. feet per hour.

Carbonic acid :

1st time	·677
2nd „	·885
Mean	·781 per 1,000 vols.

or 95 per cent. excess over the outer air.

From this we find the movement of air :— $\frac{\cdot 6}{\cdot 000781 - \cdot 0004}$ = 1,575 cubic feet per head per hour.

Movement of air by Montgolfier's rule = 1,241 cubic feet per head per hour.

There was thus *actually* supplied about *one-half* of the necessary quantity of air.

3rd Set of experiments. External air. THIRD SET OF EXPERIMENTS, FROM 4·30 TO 6 A.M.

External Air—6 A.M.

Temperature—dry bulb	47°
„ wet „	44°
„ dew-point	38·5°
Humidity	73 per cent.

No. 2, ground. *No. 2, Ground Floor*, 4·30 A.M.—Smell noted as "fresh."

Temperature—dry bulb	56°
„ wet „	51°
„ dew-point	46·3°
Humidity	70 per cent.

Movement of Air :

Chimney	—601 per min.
	= —14,424 cub. feet per hour.

Carbonic Acid :

1st time	·612 at farthest end
2nd „	·424 near door.
Mean	·518 per 1,000 vols.

or only 29 per cent. excess above the outer air. If this *mean* be accepted, it gives the following movement of air :— $\frac{\cdot 6}{\cdot 000518 - \cdot 0004}$ = 5,085 cubic feet per

head per hour,—an amount which is barely credible. The determination at the door end was of course affected by the sudden and unavoidable rush of air on opening it.

Movement by Montgolfier's rule = 2,156 cubic feet of air per head per hour.

It is difficult to believe that even a very strong breeze should have made such a difference by aspiration, particularly as the case was an isolated one.

No. 3, First Floor, at 4·45 A.M.—Smell noted as "close." *No. 3, 1st floor.*

Temperature—dry bulb	56°
„ wet „	51°
„ dew point	46·3°
Humidity	70 per cent.
Movement of Air:	
Chimney	−400 per min.
	= −9,600 cub. feet per hour.
Carbonic acid:	
1st time	·656
2nd „	·687
Mean	·671 per 1,000 vols.

or 68 per cent. excess over the outer air.

From this we get the actual movement of air:—$\frac{\cdot6}{\cdot000671 - \cdot0004} = 2{,}214$ cubic feet per hour per man. This was about *four-fifths* of the required amount.

Movement by Montgolfier's rule = 1,614 cubic feet per hour per man.

No. 5, Second Floor, 5 A.M.—Smell noted as "fresh." *No. 5, 2nd floor.*

Temperature—dry bulb	56°
„ wet „	51°
„ dew-point	46·3°
Humidity	70 per cent.
Movement of Air:	
Chimney	−454
	= −10,896
Carbonic Acid:	
1st time	·696
1nd „	·700
Mean	·698 per 1,000 vols.

or 74 per cent. excess over outer air.

From this we find the movement of air:—$\frac{\cdot6}{\cdot000698 - \cdot0004} = 2{,}014$ cubic feet per head per hour, or *two-thirds* of the required amount.

Movement by Montgolfier's rule = 1,822 cubic feet per head per hour.

No. 7, Third Floor, 5·15 A.M.—Smell noted as "close." *No. 7, 3rd floor.*

Temperature—dry bulb	54°
„ wet „	49°
„ dew-point	44·1°
Humidity	69 per cent.
Movement of Air:	
Chimney	−337 per min.
	= −8,068 cub. feet per hour.
Carbonic acid:	
1st time	1·034
2nd „	1·175
Mean	1,105 per 1,000 vols.

or 176 per cent. excess over outer air.

From this we find the movement of air :— $\frac{\cdot 6}{\cdot 001105 - \cdot 0004} = 851$ cubic feet per head per hour, or a little more than *one-fourth* of the necessary quantity.

Movement of air by Montgolfier's rule = 998 cubic feet per head per hour.

Organic and Suspended Matters.

Organic and suspended matter.

In No. 7, *Third Floor.*—74 cubic feet of air were taken through a solution of potassium permanganate, with the result that ·0000468 of a gramme of the salt was destroyed by each cubic foot,—or there was organic matter present, requiring for its destruction ·0000117 of a gramme of oxygen, or ·000181 *grain* per cubic foot.

Suspended matter, &c.

In No. 2, *Ground Floor.*—120 cubic feet air were taken through a freezing mixture, and 4·7 cubic centimetres of moisture condensed. This (examined some days afterwards) showed the following:—

Epithelium, in large quantity.
Hair, and various *fibres.*
Sand.
Soot.
Crystalline substances? chloride of sodium?
Sporangia of fungi and *monads*, in considerable quantity.

There was a strong ammoniacal reaction with Nessler's solution, and the amount of permanganate required for the total quantity was,—

·0004 of a gramme.
= ·0000033 per cubic foot,
= ·000000825 oxygen per cubic foot,
= ·00000127 of a *grain* per cubic foot.

REMARKS.

Remarks.

From the foregoing experiments it may be seen that the temperature of the rooms was moderate, but that the state of ventilation, although on the whole *fair*, was far from being what we should consider as thoroughly *good*. It compares favourably with the conditions at the Tower and other barracks, but yet falls much behind the adopted standard of purity.

In only one experiment was the carbonic acid ratio below ·600 per 1,000 vols. (50 per cent. above the external air), which is believed, on good grounds, to be the maximum to which a thoroughly well-ventilated air space should reach. The general average, however, of all the observations gives a carbonic acid ratio of ·721 per 1,000, or an excess of 80 per cent. above the external air, and 20 per cent. above the limit stated above. This indicates a movement of air of only 1,869 cubic feet per head per hour, or about *three-fifths* of the supply which ought to be furnished,—viz., 3,000 cubic feet per head per hour. It is further to be noted that the experiments were made under favourable circumstances, for it was winter; and although the temperature was above the average for December, there was yet a strong breeze blowing, the aspirating power of which was considerable. Indeed, the complaint made by the soldiers is, that there is *too much wind*,—a state of things quite possible even with bad ventilation. Part of the complaint is owing to the lowest rooms being over the open gallery beneath, and the boards of the floor having parted a little. The draught round the skirting was as much as 220 feet per minute. This, however, admits of easy remedy by a little caulking.

That the air was badly distributed, at least in some cases, may be seen by the difference in the carbonic acid determination in different parts of the same room, thus:—

Room.	Carbonic Acid Ratio at			Movement of Air in cubic feet per head, per hour, calculated from CO_2 at		
	10 P.M.	1·30 A.M.	4·30 A.M.	10 P.M.	1·30 A.M.	4·30 A.M.
No. 2 Ground floor:						
Door end ..	·607	·496	·424	2,898	6,250	25,000
Farthest end ..	·710	1·059	·612	1,935	910	2,837
Difference ..	·103	·563	·188	963	5,340 (!)	22,163 (!!)

This is the most remarkable instance: but smaller differences are to be seen in the other cases.

Effect of Height.—The average carbonic acid in rooms on different stories comes out as follows :— *Effect of height.*

Room.	No. of Men.	Average Carbonic acid ratio.	Average Movement of Air per hour.	
			Cubic Feet per head.	Cubic Feet. Total.
No. 2, Ground ..	16	·648	2,418	39,688
„ 3, 1st Floor ..	18	·688	2,082	37,476
„ 5, 2nd „ ..	17	·667	2,247	38,199
„ 7, 3rd „ ..	21	·870	1,277	26,817
General average ..	..	·718	(2,006) from carbonic acid, 1,887	(35,484·5) from carbonic acid, 29,248·5

Taking the rooms according as the fire-place was on the windward or leeward side, we have,— *Fire-place on windward or leeward side.*

Rooms, and Number of Men.	Fire-place on Side.	CO_2 in each.	Average of two.	Movement of Air, Cubic Feet per Hour.	
				Per Head.	Total.
No. 2, Ground, 16 men..	windward	·648	·6575	2,830	38,415
„ 5, 2nd Floor, 17 „ ..		·667			
„ 3, 1st „ 18 „ ..	leeward ..	·688	·7790	1,683	32,818
„ 7, 3rd „ 21 „ ..		·870			
Difference	..	..	·1215	647	5,627

The difference is considerable, and much in favour of the windward side.

It may also be seen from the Tables, that when the fire-place was on the leeward side, the hot-air louvre had its current reversed, and became an outlet. *Hot-air louvre.*

As regards the *Sheringham valves*, the following points came out :— *Sheringham valves.*

1. All that acted at all acted as outlets.
2. The amount of air discharged was :—

By windward valves.. .. −19,824 cub. feet per hour.
= −4,956 „ for each room.
By leeward valves .. .. −29,639 „
= −7,410 „ for each room.

3. The valve immediately opposite the fire-place, when the latter was in the *leeward* side was inactive.

4. The valve on proper right of the fire-place (leeward side), top room, was inactive.

Total discharge with fire-place windward or leeward side.

Taking the total *measured* discharge in connection with the position of the fire-place, we find the following :—

Fire-place on—	Discharge of Air Measured.	
	In each Room.	Average.
Windward side ..	−35,063, No. 2, Ground ..	−31,797
	−28,231, „ 5, 2nd Floor ..	
Leeward side ..	−26,136, „ 3, 1st „ ..	−23,772
	−21,408, „ 7, 2nd „ ..	
Difference	.. ..	−8,025

And out of the discharge on the leeward side, about *one-ninth* was due to the reversed current in the hot-air chamber.

Comparison with Montgolfier's rule.

That the amounts actually measured corresponded pretty closely with the average to be expected, may be seen from the following comparison :—

Rooms.	No. 2.	No. 3.	No. 5.	No. 7.
Total gross movement of air *measured* ..	35,063	26,136	28,231	21,408
Do. do., calculated by Montgolfier's rule .	36,704	27,075	31,503	19,806
Difference	+1,641	+939	+3,272	−1,602

There is in each case (except the last), a slight excess by the theoretical calculation ; but on the other hand, the actual amount, as calculated from the carbonic acid, is still greater, as may be seen :—

Rooms.	No. 2.	[illegible]	No. 5.	No. 7.
Movement of air, by Montgolfier's rule ..	36,704	27,075	31,503	19,806
Do. do., calculated from carbonic acid ..	39,688	37,476	38,199	26,817
Excess of latter	2,984	10,401	6,696	7,011

Complementary action of ventilators.

A complementary action was also observable in the different ventilators, for if one appeared to give less than theory assigned to it, some other was sure to be in excess ; and the following Table shows this :—

Rooms.	No. 2.	No. 3.	No. 5.	No. 7.
Discharge of air by chimney ..	−21,038	−11,040	−13,200	−11,328
Do. do., by Sheringham valves..	−14,025	−12,312	−15,031	−7,824
Do. do., by reversed current in hot-air shaft	..	−2,784	..	−2,256
Total of the two last ..	−14,025	−15,096	−15,031	−10,080
Grand total..	−35,063	−26,136	−28,031	−21,408

The above numbers are from actual observation. The following are got by Montgolfier's rule :—

Rooms.	No. 2.	No. 3.	No. 5.	No. 7.
Discharge of air by chimney ..	−14,500	−11,005	−9,255	−8,090
Do., by the Sheringham valves..	−22,204	−16,070	−22,248	−11,716
Grand total	−36,704	−27,075	−31,503	−19,806

Here it may be seen that some temporary condition changes the volume of air passing through the different apertures. In No. 2 the calculation comes out very near the fact,—only, the amount discharged by the chimney (as calculated) has actually been discharged by the Sheringham valves, and the theoretical amount for the valves by the chimney. The same thing is seen in No. 7, where a discharge took place by the hot-air louvre. In No. 3, the theory and the observed facts correspond very closely (viewing the louvre as one of the valves) ; whilst in No. 5, a modification of the compensation arrangement is seen. At the same time, although in individual rooms there are differences between the theory and observation, it is remarkable how close the amounts from the *whole block* accord :—

Total discharge, *measured*	−110,638	cub. ft. per hour.
Do., by Montgolfier's rule, for the same period	−115,086	„
Do., by Montgolfier's rule. Average of all the night's calculation	−111,091	„

Comparing this with the real movement, as calculated from the carbonic acid, we have the following :—

Total discharge, *measured*	−110,638	cub. ft. per hour.
Do., calculated from the carbonic acid ..	−142,180	„
Excess of the latter	−31,542	„

There was, therefore, a difference of 31,542 cubic feet per hour, or about 22 per cent. (or rather more than *one-fifth*) of the actual movement could not be ascertained by measurement. Doubtless, the greater part of this got access by the opening of the door, or by chinks, &c. ; whilst some of it was probably due to the intermittent aspirating influence of the wind as it rose and fell.

CONCLUSIONS.

The conclusions to be drawn from the above observations are, I think, the following :— *Conclusions.*

1. The ventilation, though better than in many places, is still by no means what it ought to be. Only *three-fifths* of the required amount of air per head is supplied, and had the rooms been full, their condition would have been much worse ; for then the average carbonic acid, instead of being only ·721 per 1,000 vols., would have been ·822, and the supply of air only 1,421 cubic feet per head per hour, or less than *one-half* of the required amount.

2. The ventilation appears, on the whole, to be best with the fire-place on the *windward side* of the room, the discharge of air being greater both by chimney and valves.

3. When the fire-place is on the leeward side, the effect of the *hot-air shaft* is, to a great extent, lost, and it is apt to become an *outlet*.

4. The lowest rooms are, on the whole, the best ventilated, the *top* one certainly the worst.

5. The want of an outlet is a great objection, as is also the absence of any provision for carrying off the gas products.

6. Under any circumstance, the sectional of ventilation aperture is much too small, for although the opening of windows may supplement this in

summer time, in winter dependence must be placed on the ventilators, and such casual supplies of air as may be got through doors, chinks, &c. Even in summer, men of the class from which soldiers are obtained, seldom dream of opening a window, except in time of oppressive heat, and in winter *never*. It is therefore, I conceive, absolutely necessary to supply a system of ventilation which shall go on at all times of day and night, and be in a great measure independent of season or individual caprice.

ber 16 *and* 17, 1868.

No. 2, nd Floor.	No. 3, 1st Floor.	No. 5, 2nd Floor.	No. 7, 3rd Floor.	External Air.	
				16 Dec. 12 p.m.	17 Dec. 6 a.m.
30 am.	4·45 a.m.	5 a.m.	5·15 a.m.		
..	..	..	..	..	..
..	..	..	..	..	..
Fresh	Close	Fresh	Close	..	..
56°	56°	56°	54°	50°	47°
51°	51°	51°	49°	48°	44°
46°·3	46°·3	46°·3	44°·1	45°·9	38°·5
·317	·317	·317	·288	·309	·233
3·5	3·5	3·5	3·3	3·5	2·7
1·5	1·5	1·5	1·4	·6	1·
70	70	70	69	86	73
..	..	..	..	..	

mission to Abyssinia in 1865 for the purpose of negotiating the release of the

APPENDIX No. VI.

MEDICAL HISTORY OF THE ABYSSINIAN EXPEDITION.

By Inspector-General CURRIE, C.B., Principal Medical Officer.

THE Expedition to Abyssinia in 1867-68 was undertaken, as is well known, for the purpose of effecting by force the liberation of the European prisoners, some of whom had languished in chains and captivity there for nearly five long years.

It is difficult to account, or assign a satisfactory reason, for the extraordinary and unjustifiable conduct of Theodore, King of Abyssinia, towards the British and German prisoners, excepting on the ground that his violent and ungovernable temper impelled him to acts of cruelty and injustice such as might only be expected from an insane rather than a rational being.

This violence of temper, which formed such a prominent trait of his character, appears to have been aggravated by habitual indulgence in his favourite liquor, "araki." Yet at times he would converse for hours together agreeably and intelligently, for he affected to possess some knowledge of European and Indian history and literature; and until lately he read the Scriptures daily, and was never at a loss for a biblical quotation.

Able, intelligent, and energetic, Theodore was undoubtedly superior to any prince in Abyssinia; and by these qualities, combined with great personal courage, he rapidly rose from a humble position to that of conqueror and king of Abyssinia.

For some years his rule was enlightened and prosperous, and might have continued so but for the great change which latterly took place in his character,—a change which was followed by the most cruel oppressions and wholesale massacres of his subjects.

This unfortunate change of character and conduct speedily produced its natural results, and province after province revolted from his rule; and though his name and the recollection of his great deeds continued to inspire an extraordinary degree of awe throughout the length and breadth of Abyssinia, his power rapidly declined.

The British Consul, Cameron, the first in rank and importance, was alleged to have incurred the displeasure of King Theodore soon after his arrival in the country, in consequence of having made a journey to the Egyptian province of Kassala and the debateable one of Bogos, on the northern side of the Abyssinian frontier. The object of this expedition was partly to dissuade the Egyptian authorities from aggressions, and extorting tribute from Christian subjects of Abyssinia, and partly to procure information regarding the state and prospects of commerce there.

For this he was unjustly accused of coquetting with the Egyptians,—or Turks, as they are called in that country,—the encroaching neighbours and enemies of Theodore. The King further visited his wrath upon the British Consul for not procuring from the Queen of England an answer to the now famous letter which he had addressed to Her Majesty; and Theodore, proud and revengeful above all men, never forgot or forgave an injury, whether real or imaginary, during the latter years of his life. Such were the ostensible reasons for throwing the British Consul into prison and loading him with chains; but later events seem to render it probable that the King was influenced by other motives than personal dislike or disapproval of the conduct of Consul Cameron; and this view of his conduct is strengthened by the fact of his subsequent violation of the laws of civilized nations in the case of Messrs. Rassam, Blanc, and Prideaux, who were sent on a peaceful mission to Abyssinia in 1865 for the purpose of negotiating the release of the

Consul and other British subjects, and against whom he had no just or even apparent grounds of complaint.

It was stated by those who had frequent opportunities of conversing with the King, that he appeared to be pleased at the prospect of a British force coming to Magdala, and even boasted of the success of his stratagem.

He was, it would appear, full of hope of being able to conclude an advantageous treaty with us,—a treaty which, in his declining fortunes, might have the effect of improving his position, and reinstating him in power in Abyssinia. This, as well as to gratify offended pride, may reasonably be accepted as a probable explanation of the object the King had in view in detaining British officials and subjects in captivity until a military force actually came to Magdala to demand their release.

The sequel of this stratagem proved deeply disastrous to Theodore, and a just retribution for his innumerable crimes.

The British Government, anxious to avoid the risk and expense of sending a large military force into a country so remote and unknown as Abyssinia, tried and exhausted every means which could have been honourably adopted to obtain the release of the prisoners; but Theodore proved inexorable: he had evidently made up his mind not to yield to diplomacy, and the British Government had therefore no alternative left but to dispatch an Expedition to obtain the release of the prisoners by force.

Bombay having been selected as the most convenient point in India for the Expedition to proceed from, an exploring party was dispatched from thence in September, for the purpose of ascertaining two important points,—1st, the best place for the debarkation of the troops on the coast of Africa; and 2ndly, to discover a practicable route by which the high land of Abyssinia could be reached.

The exploring party, headed by Colonels Merewether and Phayre, and accompanied by a detachment of Native Cavalry, sailed from Bombay in the middle of September, and arrived on the African coast early in October.

The first place visited was the Turkish settlement, Massowah; but this, for several reasons, proved unsuitable: the harbour was small, fresh water scarce, and the distance to the highlands too great. Annesley Bay, on the same side of the Red Sea as Massowah, was next explored, and the point ultimately selected for the disembarkation of the invading force was on the west side of this bay, near the modern village of Zoolla, lat. 15° 15′ N., long. 39° 46′ E.—the Adulis of the ancients,—and which was established by the Greek merchants of Egypt for carrying on their trade with Axum, the ancient capital of Tigré; but Zoolla has long since ceased to be a trading port, and the Turks have substituted for it the modern one of Massowah.

The part of Annesley Bay selected had the advantage of deep water near the shore and room for a fleet of any magnitude, and, further, was within a short distance of a pass leading to the Abyssinian Plateau.

The sandy plain intervening between the sea and the lower range of hills is only about 12 or 13 miles broad, and is intersected by several dry watercourses; near the sea this hot and waterless plain is sprinkled with salt bushes, and further inland with thorny acacias, &c.

Though the sea was sufficiently deep for ships of any tonnage to approach within a moderate distance of the shore, the disembarkation of troops, stores, &c., was further facilitated by the construction of a stone landing-pier with a tramway 400 yards long, and at a later period a second landing-pier of wood was constructed for the exclusive use of the Commissariat Department.

The chief drawback to this and every other point on this coast for the disembarkation of large numbers of men and animals was the total absence of fresh water. It is true that water was found at Weah Hadoda and Koomaylee, at the foot of the first mountain range, but all these were too far distant to be of any use to the Camp at Zoolla.

It therefore became necessary to have recourse to the expensive process of condensing sea water; and the camp was at first entirely supplied with water condensed by the steamers in harbour, and, at a later period, the supply was supplemented by condensers established on shore.

The consumption of fresh water was necessarily very large, amounting at one time to 50,000 gallons per diem. Each individual was allowed 1½ gallons

daily, and animals were allowed to drink from the troughs once a day *ad libitum*.

The watering of many thousands of animals daily was an interesting spectacle.

Passing on from the arrangements for the troops at Mulkutto, as the camp was at first called, the next object was to discover the best and easiest route to the Abyssinian plateau. This, in point of fact, formed the greatest difficulty of the expedition, and although few will now coincide in opinion with Dr. Krapf, that when the highlands were once attained the campaign was virtually over, yet it must be admitted that the natural obstacles which had to be surmounted in accomplishing this were of a very formidable character.

Further experience of the country proved that many other physical difficulties of no mean magnitude had to be encountered before Magdala could be reached.

In order to gain the plateau it was necessary to find a way through the imposing mountain barrier which renders Abyssinia almost impenetrable from the east.

With much labour and fatigue three routes were examined by the exploring party, one along the bed of the Alliguddy mountain torrent leading to Kiagour; another, the Tecunda Pass along the dry bed of the Hadas; and the Koomaylee or Senafe Pass along the bed of the Nebhaguddy torrent.

For many reasons the last was considered the most eligible, and measures were immediately adopted for the purpose of clearing this pass of rough stones, boulders, and other obstacles; and four small military posts and depôt hospitals were soon established in its course. The lowest of these posts was at Koomaylee, at the gorge leading into the pass and 13 miles from Zoolla; the others were established at Upper Sooroo, Undul Wells, and Rayray Guddy.

The length of the pass from Koomaylee to Senafe is 49 miles, and the scarcity or almost total absence of water formed in the first instance a serious drawback to it.

Fortunately, this difficulty was completely overcome by the successful employment of Norton's American tubes and Bestier's chain pumps at the several stations in the pass. By these means water of excellent quality was obtained, and after a little while sufficient in quantity to meet every demand.

The chief beauties of the pass are met with in the lower third, called Middle Sooroo; here the ascent is steep and the gorge not more than 50 to 100 feet wide, the cliffs of gneiss, 1,000 feet high, rising almost perpendicularly.

This narrow watercourse is blocked up with gigantic boulders of gneiss tumbled and heaped up in an extraordinary manner, and demanding considerable engineering skill and labour to make a practicable road over and between them.

From Upper Sooroo, 2,400 feet, to Rayray Guddy, 6,200 feet above the level of the sea, the road is naturally good and the ascent more gradual, the gradient being 1 in 40. In this, the upper part of the pass, the gneiss formation disappears and is succeeded by schistose metamorphic rocks, and frequently recurring veins of quartz. Here trees of the fig tribe, peepuls, banyans, or a tree closely resembling the Indian banyan, are met with; as also tamarisks, jujul trees, and various mimosas; and towards the head of the pass, junipers, wild aloes, olives, pines, and kolquhols are plentiful. The scenery throughout is grand and imposing, but the central portion of the pass is extremely winding and somewhat monotonous.

The Senafe plateau, 7,400 feet high, is extensive and undulating, and presents at once the characteristic features of this part of the country, viz., lofty flat-topped sandstone mountains with precipitous scarped sides, and the view ahead is that of an endless succession of mountain ranges bare and unattractive in the last degree.

Expeditionary Force.

The British Government having at length resolved to send an Exped to Abyssinia for the purpose of liberating the European prisoners, the follow-

ing General Order was published, dated Bombay Castle, 11th November, 1867:—

"Under instructions from Her Majesty's Government, the Right Honour-"able the Governor in Council has been pleased to direct that a field force be "prepared and dispatched for service in Abyssinia, under the command of "Lieut.-General Sir Robert Napier, G.C.S.I. and K.C.B."

The constitution of the force ordered for field service was as follows:—

Cavalry.

1 wing of the 3rd Dragoon Guards.
10th Regiment Bengal Cavalry.
12th " "
3rd " Bombay Cavalry.
3rd " Scinde Horse.

Artillery.

G, 14th Brigade Royal Artillery.
No. 3 Battery, 21st Brigade.
" 5 " "
Native Battery Mountain Train.
No. 5 Battery, 25th Brigade, from Bengal.

Engineers.

10th Company Royal Engineers, from England.
3 Companies Bombay Sappers and Miners.
3 " Madras " "

European Infantry.

1st Battalion 4th Regiment (King's Own).
26th Regiment.
33rd "
45th "

Native Infantry.

Detachment Marine Battalion.
2nd Regiment Bombay Native Infantry.
3rd " " "
10th " " "
18th " " "
25th " " "
27th " " Beloochees.
21st Punjaub Infantry.
23rd " "

The aggregate strength of the force above detailed was 12,500. Of this number 4,200 were Europeans, and 8,300 native troops.

The different branches of the Service were represented by 220 European and 1,800 Native Cavalry; the Artillery by 550 Europeans and 145 Natives; the Engineers by 88 Royal Engineers—the Bombay and Madras Sappers contributing 875, including 19 European officers.

The European Infantry numbered 3,292, Native Infantry 5,225, and the General Staff 37.

The Indian followers, public and private, including muleteers, dhooley-bearers, Army Works Corps, and a host of others besides, amounted to 19,000.

I may here observe that the strength of the force which would be required for the successful invasion of Abyssinia was a point regarding which there was much difference of opinion at the time the above troops were ordered for service.

Some were of opinion that a force of 5 000 would be sufficient; others, whose opinions were entitled to more consideration, doubled the above figure; while the Commander-in-Chief, from the first, maintained that it would not be wise to send into a country so little known as Abyssinia a smaller force than that which was ultimately dispatched; and now that the Expedition has

been brought to a successful conclusion, I apprehend few, if any, will venture to assert that there was a single soldier too many, or one more than was necessary for keeping open our communication with the base of operations, and protecting the numerous depôts and posts on the long line of 400 miles between Zoolla and Magdala, and allowing of an advance column for attacking Magdala itself.

It is true that at an early period of the campaign we heard much of a dash being made upon Magdala by a select band of spirits more enterprising than wise; but the high mountain ranges and formidable ravines of the province of Lasta effectually dispelled all such wild and impracticable schemes.

In projecting an Expedition into Abyssinia, it was necessary to bear in mind that a force was required sufficiently strong not only to punish Theodore, but to overawe the independent chiefs of Tigré, Lasta, and Shoah, who were all at enmity with Theodore and with each other.

Heads of Departments and other Staff Officers.—The personal Staff of his Excellency the Commander-in-Chief consisted of the usual complement of Aides-de-Camp.

Military Secretary, Colonel Dillon.

Political Secretary, Captain Tweedie.

Persian and Arabic Interpreter, Captain H. Moore.

Surgeon, Dr. Lumsdaine.

The Intelligence Department was represented by M. Munzinger, Major Grant, and Captain Speedy.

The appointment of Deputy Adjutant-General was filled by Colonel the Hon. F. Thesiger, and that of Assistant Adjutant-General by Colonel Macleod.

The appointment of Deputy Quartermaster-General was held by Colonel Phayre, but the duties of the department were discharged by the Senior Assistant Quartermaster-General, Captain Holland. Colonel Phayre was specially employed in advance of the column, in surveying and lining out the road to Magdala.

Political Officer of the Expedition, Brigadier-General Merewether.

Controller of Supply and Transport, Colonel H. W. Holland.

Deputy Judge-Advocate-General, Major Maude.

Divisions.—The 1st Division was commanded by Major-General Sir Charles Staveley.

Assistant Adjutant-General, Colonel Wood.

In the 1st Division were included all the troops in advance of Antalo.

The 2nd Division was commanded by Major-General Malcolm.

Assistant Adjutant-General, Major Bray.

The 2nd Division, Head-Quarters at Antalo, comprised the troops between Senafe and Antalo.

While the troops at Zoolla and those stationed in the pass were commanded by the Brigadier-General at Zoolla.

Brigades.—The Artillery Brigade was commanded by Brigadier-General Petrie, and Colonels Wallace and Milward were the two Divisional Officers.

1st Infantry Brigade, Brigadier-General Schneider.

2nd " " " " Wilby.

These brigades were in advance of Antalo; and the Cavalry in advance was commanded by the Senior Officer of that arm of the Service.

3rd Infantry Brigade at Antalo, commanded by Brigadier-General Collins.

4th Brigade, by Brigadier-General Stewart at Zoolla. At a late period of the campaign Major-General Russell commanded at Zoolla, and the Head-Quarters of the 4th Brigade were transferred to Senafe.

The Royal Engineers were commanded by Colonel Wilkins, who had a Staff of four Field and eight Assistant Field Engineers.

Medical Department.

British Service.—The writer, with the local rank of Inspector-General, was the head of the British Medical Service and Principal Medical Officer of the Expedition.

Staff Assistant-Surgeon, W. T. Martin, Secretary.

In addition to the Regimental Medical Officers, the General Medical Staff consisted of:—

A Sanitary Officer, Surgeon-Major Moorhead.
Three Staff Surgeon-Majors.
Three Staff Surgeons.
Ten Staff Assistant Surgeons; and besides the Medical Staff ashore, three Staff Surgeons and three Staff Assistant-Surgeons were employed in the hospital ships.

Indian Medical Service.—Deputy Inspector-General Pelly, 2nd Division, stationed at Zoolla.

Deputy Inspector-General Mahaffy accompanied the 1st Division in advance.

Two Field Surgeons, one to each Division, and two Medical Storekeepers.

A surgeon in charge of general hospital at Zoolla, and two in charge of hospital ships.

Ordnance Department.

Deputy Commissary of Ordnance, Captain Swanson.

Commissariat Department.

Deputy Commissary-General Colonel Lucas, with a Staff of five Assistant Commissary-Generals and nine officers of inferior grades.

Land Transport Train.

Director, Colonel Warden, with a Staff of 14 Captains of Divisions, each division comprising 2,000 animals, 28 subalterns, and 10 veterinary surgeons.

Pay Department.

Two Field Paymasters.
One Treasurer.

Ecclesiastical Department.

Three Chaplains.

The Military Powers of Europe sent their representatives to the Abyssynian Expedition.

Thus France sent 2 officers.
Prussia „ 3 „
Austria „ 2 „
Italy „ 2 „
Holland „ 2 „
Spain „ 2 „

Science was likewise represented.
Meteorology, by Dr. Cook, Bombay Medical Service.
Archæology, by Mr. Holmes, British Museum.
Geography, by Mr. Markham, Secretary to the Royal Geographical Society.
Geology and Natural History, by Mr. Blandford, of the Indian Geological Survey.
Fine Arts, by Mr. Simpson.

The Newspaper Press was represented by special correspondents from India, England, and America.

Preparations for the Expedition.

No sooner had the British Government come to the determination of sending an Expeditionary Force to Abyssinia, than the most active measures were taken in India; the preparations required were necessarily on an extensive scale, and of a varied description.

A large amount of shipping for the conveyance of troops, stores, and transport animals was required; fortunately at this time the harbour of Bombay was well supplied with steamers and sailing-vessels of the largest class, and their number was rapidly increased by arrivals from other eastern ports; a few large steamers were taken up in England, and three large steamers, fitted up as hospital ships, were also sent out.

Though the Naval Transport formed a large and perhaps the most expen-

sive part of the preparations, the procuring of a sufficient number of animals, adapted to the Land Transport Service was a still more difficult matter.

For a mountainous country, mules were obviously the best description of carriage, and agents were accordingly dispatched to purchase mules on a large scale in various countries, including Spain, Italy, Egypt, and Persia; while India itself furnished considerable numbers of mules, ponies, and pack bullocks; and camels in considerable numbers were procured from Egypt and Arabia.

The amount of Land Transport required was necessarily very large, and though mules were procured in vast numbers, great difficulty was at first experienced in finding efficient muleteers to take charge of them; the consequence was, that some of the earlier importations were most unfortunate; mules were landed, but men to take care of them were not provided; many, therefore, died of disease or from neglect, and many strayed away, or were stolen by the Shohos.

This was a bad beginning, but not the first of the kind in the history of British military expeditions. After the age of confusion and mismanagement had passed away, efficient muleteers were obtained from India, a better organization was introduced, and carried out with laudable perseverance on the part of the officers of the Transport Department.

Having in the foregoing observations adverted to the preparations to the Sea and Land Transport Services, I need only add that the Commissariat, Ordnance, Medical, and every other Department of the Service, was now busily engaged in preparing for the Expedition.

In this campaign the Land Transport was separated from the Commissariat and constituted an independent department, under a director specially appointed; and though this innovation was somewhat unpalatable, I believe, to the Commissariat, I am of opinion that the arrangement was a good one and conducive to the interests of the Service.

In connection with the subject of Sea and Land Transport, it may be here stated that for the former 688 ships were chartered, while for the latter the number of animals landed at Zoolla was as follows:—

Elephants	44
Mules	16,022
Ponies....	1,651
Camels....	5,738
Donkeys	1,759
Bullocks	7,071

But the last included oxen for the provisioning of the troops at Zoolla as well as pack-bullocks for transport.

Camp Equipage.

Two kinds of tents were provided, viz., Indian tents for the lowlands, where the temperature was high, and English double or single cloth bell tents, for the cooler climate of the highlands.

The weight of the double fly tent was 116 lbs., and that of the single one 65 lbs., including pole and pegs. One mule carried one of the former and two of the latter description. Twelve rank and file were told off to each bell tent.

Hospital camp equipage for a regiment consisted of three double and two single cloth bell tents, and the field and principal depôt hospitals were organized on the same scale. The above scale of camp equipage was in use on the highlands until the force arrived at Dildee, on the north side of the Wandatch range of mountains, and from which Magdala was then supposed to be about 50 miles, but the actual distance proved to be much greater.

When the Expedition had arrived at this post, military reasons indicated the necessity for increasing the mobility of the force by reducing the baggage to the lowest point compatible with health and efficiency. A depôt was accordingly established at Dildee for the storing of surplus kit and camp equipage, &c.

Single cloth tents were then substituted for double fly tents, and the following scale was adopted:—

Major-Generals, one tent.

Brigadier-Generals, one tent for themselves, and personal and brigade staff.

Tents were allowed in the proportion of one to every 12 officers, and one to every 20 non-commissioned rank and file, and the load of a mule was reduced from 150 lbs. to 100. Officers who had spare riding-horses were allowed to take them on for the carriage of their bedding, and those who had none were allowed public carriage for two blankets and a waterproof sheet.

European troops were ordered to march in serge or kakee clothing, according to the state of the weather, and carriage was allowed for the second suit of clothing; while the soldier himself carried one blanket and one waterproof sheet in addition to his great coat and canteen.

Carriage was provided for the cooking utensils of officers in the proportion of one mule to 12 officers, and for the cooking-pots of the troops in the proportion of 50 lbs. per troop or company.

All office establishments and records were ordered to be left at Dildee, as also beds, tables, stools, and other impedimenta.

Cooking Utensils.—Those for the troops were of the kind in common use in Indian cantonments; and it is difficult to conceive anything more unsuitable for campaigning in a mountainous country like Abyssinia, where it was a matter of pressing necessity to reduce the weight and bulk of baggage to the lowest possible extent.

The canteen equipment of hospitals was equally ill adapted for field service. It was unfortunate that an adequate supply of field canteens of a compact and portable description had not been sent out from England for the Abyssinian Expedition.

Clothing.—The clothing of the troops was well adapted to the climate and service. This consisted of serge and kakee suits, flannel shirts and belts, woollen socks, boots, and leggings; the bedding, of blanket and waterproof sheet. The bedding and spare clothing of each soldier was packed in a painted canvas bag, the whole weighing 25 lbs.

Rations.—The scale of rations for the troops at Zoolla and on the Highlands, as far as Antalo, was nearly the same as that in India, with the exception of the daily issue of 2 ozs. of compressed vegetables, and the increase of meat to 1½ lbs.

The following scale was laid down for the troops which went beyond Antalo:—

Flour or Biscuit	1 lbs.
Meat	1½ ,,
Salt....	¾ ozs.
Tea	¼ ,,
Sugar	1½ ,,
Ghee	2 ,,
Compressed vegetables	2 ,,
Rum	1 dram.

As a matter of fact, the troops were fairly well fed until they arrived at the River Tekazzie, when the native transport broke down, and upon which the Commissariat mainly depended for the carriage of their supplies from the central depôt at Antalo. The effects of the failure of Commissariat supplies and of the exclusive use of beef and flour rations will be noticed hereafter in connection with the health of the troops at this period.

Sick Carriage.—In every climate and country where war has been carried on, the subject of the best description of carriage for the sick and wounded has proved one of great difficulty, and regarding which great diversity of opinion has prevailed.

For the Abyssinian Expedition ambulance carts were provided, but for obvious reasons they were not of the smallest use, and never left the base of operations. Cacoletes were also furnished, but they were not brought into play. The large Spanish mules which were alone suited to cacoletes were required for other purposes, such as the carrying of the mountain batteries, and the transport of stores in Maltese carts to the highlands.

It was fortunate that circumstances prevented cacoletes being taken to the front, inasmuch as the narrow and precipitous mountain paths would have rendered their use extremely unsafe, and the same objection applied to mules kujavahs, of which a considerable number were supplied.

The carriage which proved the most useful was the dhooley, for severe cases of disease, and the pad mule for convalescents or slight cases.

Of the dhooly, three kinds were provided, viz., the common Indian dhooly, the Madras dhandy, and the M'Guire field hammock. In considering the relative merits of these, it may be observed that though the dhooly has the advantage of forming a comfortable bed in camp, it is objectionable on account of its great weight, which varies from 90 lbs. to 120 lbs.

The Madras dhandy is merely a light description of dhooly, and weighs about 46 lbs., this also forms a comfortable bed, and is comparatively light and easily carried.

The M'Guire field hammock is constructed by lashing the hammock to an ordinary dhooly pole, and the weight is only 21 lbs.

Though light and easily carried over mountains, the field hammock has the disadvantage of not forming a bed for the patient in camp, and the canvas invariably becomes slack and baggy in the centre. The objections to the M'Guire hammock might be got over by fitting inside the canvas a light wooden frame with tape bottom, &c.

For the dhooly ten and for the dhandy eight bearers are required, and for the M'Guire hammock six efficient bearers suffice.

The work of dhooly bearers is very hard, and consequently a large number of them knock up; it is, therefore, very difficult to maintain in anything like efficiency this description of sick carriage.

In the Abyssinian campaign the inefficiency of the bearers was greatly increased by the nature of the country, and their physical deterioration by poor fare and privations.

A dhooly bearer is an unfortunate human being hired to carry sick soldiers, but he is not expected to fall sick himself, and if by any chance he does, in nine cases out of ten he is suspected of being a schemer. From what has now been stated, it will be apparent that a really good description of carriage for sick and wounded, in mountain warfare more especially, has yet to be invented.

The proportion of dhooly carriage allowed in the first instance was 5 and then 3 per cent., and soon after arriving in the highlands, the scarcity and difficulty of transporting supplies rendered a great reduction of public and private followers imperatively necessary. The sick carriage was therefore finally fixed, from necessity rather than choice, at one dhooly and two pad mules per 100 fighting men, and 15 dhoolies to field hospitals.

This small proportion of sick carriage necessitated the formation of depôt hospitals along the line of route. These will be more particularly referred to hereafter.

Medical Stores.—A large supply of medical stores was dispatched from Bombay, and two depôts were established, one at the base of operations and the other at Antalo; eventually a small depôt was moved forward to Dildee.

Medicine Chests.—For boardship use between India and Annesley Bay two small medicine chests were supplied to each ship, and numbered 1 and 2, the former contained medicines, and the latter surgical instruments and appliances. In the field regiments were supplied with a double set of chests of a larger size, numbered 3 and 4. Wings of corps and batteries of artillery with one pair each.

The field medicine chests were made and fitted up in Bombay, according to the scale laid down for field panniers in the "Medical Regulations."

The supply of medicines which they contained was sufficiently large and varied, and the only objection that could be taken to them was on account of their excessive weight, a pair of chests complete, weighed from 180 lbs. to 200 lbs.

The best description of field chests in the Expedition were sent with the cavalry and Punjaubee regiments from the Bengal Presidency. The Bengal chests, or panniers, were made of cane-work, and rendered waterproof by a painted canvas cover. The weight of a pair did not exceed 100 lbs. Two pairs would suffice for a European regiment.

Medical Comforts.—A very ample supply of medical comforts in the mixed or assorted form was provided and packed in wooden boxes weighing 80 lbs.

Each regiment on leaving Zoolla was supplied with four and batteries of artillery with two cases, and a considerable reserve stock was carried to the front by the Commissariat.

Hospital Clothing.—This consisted of 20 suits of the ordinary Indian clothing for a regiment or field hospital, and half that quantity for a battery of artillery. The deficiency of land transport rendered it necessary to minimize the hospital and every other equipment to the lowest point compatible with the efficiency of establishments.

Instructions to Medical Officers.—Before the departure of the Expedition from the base of operations, a Circular Memorandum was issued for the purpose of directing the attention of Officers of the Medical Department to the various points of interest, which would probably present themselves in the course of the campaign, and to the duties of Medical Officers generally on field service. And in General Orders rules were published for the conservancy of standing camps.

General Medical Arrangements for the Expedition.—The regimental hospital system, which is so much in favour in our service, was maintained in all its efficiency, and the other arrangements for the sick on the general hospital plan, to which I am about to refer, may be considered as a subsidiary to it.

At the base of operations ample and excellent hospital accommodation was provided for European officers and soldiers in three hospital ships, carefully fitted up in England and provided with a staff of Medical and Purveying Officers and Army Hospital Corps men.

These three ships were calculated to accommodate 58 officers and 600 men, and they were placed under the superintendence of a Staff Surgeon-Major, and who was also charged with the administrative duties at Zoolla.

One Staff Surgeon-Major was appointed Principal Medical Officer of each division of the force, and the Sanitary Officer was of the same rank.

For the sick of the Indian troops two sailing-vessels were fitted up as hospital ships, and a large general hospital was established on shore for the reception of camp followers, and another for a similar purpose was organized at Koomaylee at the foot of the pass.

In the pass itself, 49 miles in length, three small hospitals in charge of Staff Assistant-Surgeons were established for the reception of Europeans and camp followers employed in the pass.

On the highlands, one field and two large depôt hospitals, with full establishments of Medical Officers, and 1st and 2nd class servants were organized.

The 1st depôt hospital was established at Senafe, the 2nd at Antalo, and the field hospital accompanied the advance column, and duplicates of those establishments were organized for the native troops.

This, the original programme, was fully carried out, but circumstances subsequently led to a much larger development of the depôt hospital system than was at first contemplated, and the means at my disposal fortunately enabled me to carry it out to the extent necessary to meet the requirements of the campaign.

In consequence of the sick carriage having been reduced, for the reason already mentioned, to one dhooly and two pad mules per 100 fighting men, the only way of meeting any difficulties that might arise in regard to the sick was to organize depôt hospitals at the different posts on the line of route.

Thus, in the 120 miles between Senafe and Antalo, one was established at Addegerat, and in advance of Antalo which was the central post; hospitals were extemporized for the reception of both European and native sick at Dildee, north of the Wandatch Mountains; at Sindhee, in the Wadila Plain; and the last on the Dalanta Plateau near the right bank of the Bashilo.

The depôt hospitals were found to be both convenient and useful; for, besides relieving the advancing column of a heavy encumbrance, the sick themselves derived benefit from the rest and comfort of stationary hospitals.

For the attack on Magdala the two field hospitals of the British and Indian services were reserved. These were efficiently equipped, and they received the wounded on the 10th and 13th April; and on the return march to the coast they picked up the sick of the depôts established at ten different posts on the line of 400 miles between Magdala and Zoolla.

On reviewing our experience of the arrangements made for the sick and wounded in the field it is satisfactory to be able to state, that by the regimental, field, and supplementary depôt hospitals established, sufficient provision was made for the care and accommodation of every soldier and camp follower who fell sick on the long line of country travelled over by the Expedition; and notwithstanding the scarcity of transport, which from the first formed our greatest difficulty, no instances, I believe, occurred of deficiency of medical stores or comforts even as far as Magdala itself, or of carriage of some sort to convey the sick and wounded to the coast.

Arrival of the Expedition at Zoolla.

The troops composing the force began to arrive at Annesley Bay early in December. The 33rd from Kurrachee was the first European corps to arrive, and the 26th Cameronians the last. With the exception of the 3rd Dragoon Guards all the corps destined to proceed beyond Antalo had arrived by the beginning of February, a large camp was formed on the sandy plain at Zoolla, and for several weeks the force assembled there was of considerable strength. The conservancy of the camp was well attended to, dead camels and mules were removed to a distance and burnt; offal in like manner destroyed, and the latrines were kept in good order.

At that season of the year the climate of the lowlands, though at all times to a certain extent enervating, was tolerably good, the nights were pleasantly cool, but the midday sun was powerful, the thermometer rising to 85° and 90° in tents.

The fatigue duties of the troops were heavy and involved much exposure to the sun, large parties were constantly employed in various ways, such as pumping condensed water out of the tanks into the troughs for watering many thousands of horses and transport animals, removing stores and plant for the Zoolla and Koomaylee Railway, &c.

The health of the troops while encamped here was very satisfactory. Slight bowel complaints were somewhat prevalent, especially amongst new arrivals. These attacks were probably induced by exposure to the sun, and drinking too copiously of condensed water, which was sometimes rather brackish.

Advance of the Expedition to the Plateau.

The great sickness and mortality which at first prevailed in the lowlands amongst mules and horses, caused the 3rd Cavalry and Artillery horses to be early sent up to Senafe. The European and Native troops soon began to follow, but at first in small detachments on account of the scarcity of water and provisions.

At this early stage, the great difficulty was the forwarding to Senafe Commissariat supplies in sufficient quantities to form a depôt there. While the road through the Koomaylee Pass was being made, stores were forwarded from Zoolla to the foot of the pass on elephants and camels, and thence to the plateau by mules and pack bullocks.

Although great exertions were made in this way, no great amount of success was attained until the pass was made practicable for wheeled vehicles.

On the 24th January, the first convoy of 70 bullock-carts, each carrying 750 lbs., left Zoolla for Senafe. The experiment proved entirely successful; and from that time, the great difficulty of transporting supplies from the seaboard to the highlands was surmounted; convoys of bullock-carts and of Maltese carts drawn by Spanish mules, and of Shoho bullocks, were leaving Zoolla daily, and a large Commissariat store was soon established at Senafe, and from thence supplies were forwarded to Antalo, partly by our own transport mules, but chiefly by Abyssinians, who contracted to carry them on mules, donkeys, men, women, and children at so much per package. From January to March, troops were continually moving up to Senafe, and in the same manner passing on in succession to Antalo, which is about half-way to Magdala.

The first five marches proved of great advantage to the efficiency of the advancing force, inasmuch as the difficult nature of the road through the Koomaylee pass at once tested the physical capabilities of the troops, and enabled us to eliminate those who were sickly or unfit for hard work. The

mountainous aspect of Abyssinia was alone sufficient to convince anyone that none but men in the highest state of health were fit to campaign in such a country, and the small experience already gained enabled Medical Officers to select from the different corps, on their arriving at Senafe, 100 men who were either sick or too weak for field service. These were left at the Senafé depôt; and, with others of the same class selected at Zoolla, were eventually sent home by the overland route.

The Shohos, the Mussulman inhabitants of the country extending from the seaboard to Senafe, are a thin, wiry people of middle stature,—of Caucasian and not unpleasant features. The hair on the sides of the head is worn in short, corkscrew ringlets; while that on the top is short and frizzled. Their clothing is a scanty calico garb, and personally they are extremely dirty.

The province of Tigrê, the capital of which is Adowa, commences at Senafe, and extends some distance to the south of Antalo. At Senafe, the first Christian village is seen; and on arriving here,—the first post on the plateau; and 7,400 feet above the level of the sea,—a large permanent camp was established on an extensive undulating plain. On one side the encampment was bounded by gigantic masses of sandstone rocks overlaying the schistosé formation, and forming remarkable peaks and precipices; on the other by an open valley, from which a plentiful supply of water was obtained by means of Norton's American tubes. Here a great change of climate was experienced: in January and February the nights were cold even to the freezing point, and the days were hot; the daily range of temperature amounting to 45° and 50°.

At Addigerat, 37 miles in advance of Senafe, a military post and dépôt hospital were established. In this, the first section of the road on the plateau; the villages are small, and the houses constructed of stone and mud, and flat-roofed. After passing Addigerat, the true Abyssinian type of house, or rather hut, becomes universal,—viz., circular walls of stone or reeds, and high, conical, grass roofs, resembling exaggerated beehives. Between Senafe and Antalo the rocks are chiefly sandstone, and the country is undulating or hilly, and always dry, stony, and barren. Grassy plains and large herds of cattle were occasionally seen. Scrub jungle, and the stiff, candelabra-shaped kolquoll, a cactiform euphorbia, were observed on every mountain; while the mimosa, sycamore, corinda, wild olive, rose, and aloe occupied the less elevated localities.

At Senafe, as already mentioned, a plentiful supply of good water was obtained, but on the line of march to Antalo scarcely a drop was procurable anywhere except at the camping grounds, and then only in moderate quantity from stagnant pools or ditches, for no wells were seen in Abyssinia.

The advance column arrived at Antalo early in March, and here the head-quarters of the 3rd Brigade, a large central Commissariat depôt, and depôt hospitals for European and Native sick, were established.

The European troops continued to enjoy a high degree of health, and after the weeding they had lately undergone at Senafe, there were not more than 30 sick and weakly men to leave behind at this post. Bowel complaints, as heretofore, continued to be the prevailing diseases, but few of them were of a severe nature.

The country in the vicinity of Antalo was found to be more productive of supplies than any place we had yet seen. A market was held daily, and flour was purchased in considerable quantity. This proved of great service to us, and it was forwarded with our imported provisions chiefly by native agency. Hitherto the laborious operation of road-making had been chiefly performed by the Indian troops, but after passing Antalo, the Europeans took their share of the work.

The 1st Division, consisting of the 1st and 2nd Brigades of Infantry, Cavalry, and Artillery, comprised the troops destined to proceed beyond Antalo. These now began to move forward, and the Commander-in-Chief left on the 12th March.

After passing Antalo, the Alpine province of Lasta, ruled over by Wagshum Gobazai, is entered; and here the mountains are loftier, and the country more difficult and impracticable for troops than any other part of Abyssinia. This region may be described as a sea of mountains, running irregularly north and south, and forming the water-shed,—the drainage on the west side running to

the Nile, and that on the east to the sea. These mountains are crossed by others of great elevation, extending east and west, and from the summit of some of these passes glorious views were obtained; and it may be remarked that the mountains here did not present the flat-topped and scarped appearance which forms the striking features of the sandstone formation of Tigré. Lasta, too, is more plentifully supplied with moisture, and consequently vegetation is richer and more varied, and the valleys and mountain-sides are, in many places covered with trees and flowering shrubs.

In this district, villages,—mere clusters of circular thatched huts,—are more numerous, and perched on isolated mountains, or on spurs of hills, and fenced round with hedges of thorn or kolquoll; and the church, a hut of larger size, is generally seen at no great distance from the village, surrounded by a clump of tall junipers and venerable-looking banyan trees.

From Antalo to the Takazie River the distance is about 130 miles, and the formidable ranges of mountains intervening between those two points are entirely volcanic. After crossing the Elaji and Ferrah Passes, both 10,000 feet high, Lake Ashangi was arrived at. This fresh-water lake, 8,000 feet above the level of the sea, is a fine sheet of water without an outlet, about five miles in length, and four in breadth, and surrounded by an amphitheatre of lofty volcanic mountains. The depth of the centre of the lake was ascertained to be 102 feet. The line of route then carried us on to Lat and Dildee. At the latter a military post was established, and a depôt hospital organized for Europeans and Natives; but fortunately there were not many of either class to drop here. At this post, too, the large reduction of camp equipage and personal luggage previously adverted to took place, and from this point on to Magdala, no troops could have possibly been in lighter marching order.

On the 26th March the head of the column ascended the great Wandatch range of mountains, 10,500 feet high, and about 80 miles from Magdala. On attaining the top of this pass, a severe storm of rain and hail took place, and in consequence of the tents not having come up, through the slippery state of the long and steep ascent, the troops were exposed to its fury during a long and bitterly cold night. I may mention that the famous koussoo tree *Brayera anthelmintica*, one of the rosaciæ, was seen here in great abundance in the sheltered valleys on both sides of the Wandatch range of mountains. The koussoo is a tall handsome tree, with bright green leaves and wide spreading branches, and from the upper ones dry flowers of a brownish colour were seen hanging like bunches of blighted grapes. The bark of the tree resembles that of the elm,—thin, and peeling off spontaneously in successive layers. After passing the Wandatch mountains, the country beyond and to a short distance from Magdala is open, fertile, and comparatively level; but instead of lofty mountains, natural difficulties of another description had now to be encountered, viz., the passage of the formidable chasms of the Takazie, Jeeda, and Bashilo rivers. Before arriving at the first of these streams, we passed within a few miles, but not within sight, of Lalibila, the capital of Lasta, a place noted for its rock-hewn churches of great fame and antiquity.

On the 28th March the Takazie was crossed by the leading brigade; the river at this point, comparatively near its source, is but a small stream, but it afterwards attains to large dimensions, and becomes one of the principal tributaries of the Nile. The descent of the right bank to the bed of the river was tolerably easy, but the ascent of the south side, a precipitous wall of volcanic rock, 2,700 feet high, was excessively steep and difficult. On the face of this, our pioneer force constructed a narrow zigzag bridle path, three miles in length, and by which the troops and baggage animals were enabled to ascend to the Wadela plain. Our first encampment here was 10,450 feet above the level of the sea, and the cold at night was very intense, 7° below freezing point.

During the progress of the Expedition through the provinces of Tigré and Lasta, the climate proved very favourable to the health of the troops, though the nights were often intensely cold, and the midday sun scorchingly hot. The daily range of the temperature was so great, that the nights, without much exaggeration, might be described as Siberian and the days tropical. Notwithstanding these great extremes of temperature, the troops were very healthy, and this satisfactory state may be mainly ascribed, I believe, to the

remarkably dry condition of the atmosphere and fine climate of Abyssinia at that season of the year.

The long ascents and descents of mountain passes and formidable ravines proved excessively fatiguing, and demanded greater physical exertion and powers of endurance than British troops have probably ever undergone. The effect of this severe training was shown in their increased capability of making long and difficult marches day after day, and with comparative ease to themselves.

The Wadela and Dalanta plateaux, which the Expedition now traversed, extend from the Takazie, on the one side, to the Bashilo River on the other, and the two are divided by the Jeeda ravine. These plains are without trees or bushes, except near villages and churches, where clumps of junipers and koussoo trees might be seen. Wheat and barley appeared to be extensively cultivated, and numbers of small horses, cattle, sheep, and goats were observed in this open country.

At Sindhee, in the Wadela plain, another depôt hospital was established, but the health of the troops continued so satisfactory, that the sick left here did not exceed 20 Europeans and about double that number of natives. It was about this point that we joined the King's Road, as it was called, the road which Theodore's army had lately made for the heavy guns which he had just marched from Debra Tabor to Magdala, a distance of 90 or 100 miles.

On arriving at the Jeeda, we found a well-made road, 30 feet wide, on the precipitous sides of this great ravine. The descent of the right bank was 3,000 feet, and very precipitous, and in the bed of the river there were only a few pools of muddy water percolating through the coarse gravel. The Jeeda, though at that time barely a running stream, is said to be a large river in the rainy season. The ascent to the top of the left bank was 2,800 feet, and proved a formidable wall to scale. The distance from the right to the left bank, by the tortuous path travelled by the troops, was nearly 10 miles. The Dalanta plain, which commences at the Jeeda ravine, and extends to the Bashilo, is about 10 miles broad; the soil is deep black, cotton, and fertile, and the supply of water at the time we were there was scanty, and derived from stagnant pools. In consequence of the failure of local transport in our rear, supplies now began to run short, and the force was delayed several days on this plain until the natives were prevailed upon to bring in grain and flour from the neighbouring district. At this time, too, the weather suddenly became sultry, and thunderstorms, with heavy falls of rain, occurred daily. The duties of the troops from the time they crossed the Takazie, were heavy, and outlying pickets without tents necessitated much exposure to rain. The camp followers were still worse off, as few of them had tents, or were protected from the weather in any way. Bowel complaints, induced by bad feeding, bad water, and exposure to wet, now became more prevalent both amongst Europeans and natives. Fortunately the nights were less cold, otherwise the troops and followers would have suffered more in health than they did.

Orders having been issued for crossing the Bashilo, the last depôt hospital for the reception of sick and weakly men was established on the Dalanta plain, near the bank overlooking the river; and early on the morning of the 10th April the 1st Brigade descended to the Bashilo, and the remainder of the force followed a few hours later. The descent from the top of the precipice to the river was 3,900 feet, and the road lately made by Theodore, though excessively steep, was wide and in good order; the river itself, a small turbid stream, was about 2½ feet deep.

Magdala is about 10 miles from the Bashilo, and the troops emerged from the bed of the stream by a valley at right angles to it, leading to the high land. The formation of the Bashilo ravine, like that of the Jeeda, is columnar basalt. The stronghold of Magdala consists of three high mountain forts, and on approaching it from the west, Fahla is first come to on the right; then Selassye, a lofty trachytic peak on the left; and Magdala itself is seen behind and between the two more advanced posts.

In the forenoon of the 10th the 1st Brigade advanced from the Bashilo for the purpose of making a close reconnaissance of Fahla, and before which it arrived about 4 P.M., after making a long detour over a steep and difficult

country in a very hot day. No sooner had the brigade arrived at that position than a battery of heavy guns opened fire on our troops. Theodore was present on Fahla, and he himself directed this ineffective fire. This preliminary operation was soon followed up by his troops rushing down from Fahla and Selassye, and attacking us in the open country, and in doing so they bravely attempted to charge our guns and turn our flank; but the fire to which they were exposed from our rockets, steel guns, and Sniders, was so deadly that after a short engagement the Abyssinian troops were completely beaten and dispersed. The loss which they sustained was calculated at 700 killed and 1,200 wounded, including many of their chiefs and leaders. This was the first time the Snider rifle had been tried against a living target, and it proved in the opinion of every one a very effective weapon. On our side only one officer and 19 rank and file were wounded, and of these six were British soldiers.

This short engagement demoralized the Abyssinian troops, and the King then saw the necessity for coming to terms with us; and for this purpose he dispatched two of the prisoners to our camp to sue for peace. The Commander-in-Chief, in reply, demanded the release of the prisoners and the unconditional surrender of the King himself, at the same time guaranteeing to him honourable treatment, &c.

The first demand was readily complied with, for on the evening of the 11th the English prisoners and German missionaries were released, and on the 12th the foreign artisans and their families were sent into the British camp, making a total of 67 captives, including women, children, and servants.

Fahla and Selassye were soon thereafter abandoned, and the greater number of Theodore's troops voluntarily laid down their arms. This army and the myriads of followers assembled there numbered about 30,000 people; but the proud spirit of Theodore refused to submit, and he, with a small remnant of the army and a few desperate followers, shut himself up in Magdala, and which was bombarded, stormed, and captured on the 13th April.

Magdala, in Abyssinia called an amba or natural fort, is a flat-topped mountain, nearly one mile long by half a mile broad, and 9,000 feet above the level of the sea. While the top of the mountain is flat, the sides are almost perpendicular, and formed of columnar basaltic rock, varying at different points from 300 to 700 feet in height. Magdala is a fortress of great natural strength, and is accessible on the west side by an exceedingly steep and rugged path leading up to a narrow gate. After cannonading for a couple of hours, chiefly for the purpose of breaking open the other gate, the fort was stormed by the British troops, and the dead body of the King was found inside the second gate. He had often declared that he would never be taken alive; and, true to his word, he died by his own hand at the moment the troops were escalading the outer wall.

In the fort of Magdala there were about 1,000 huts and 3,000 people, besides a large number of Abyssinian prisoners in chains, all of whom were immediately released. During the next few days the amba was occupied by a portion of our troops, and the remainder were encamped on the low ground in front of Fahla and Selassye. In both situations water was procured with difficulty from a great distance and of the worst conceivable quality. Forage and grain were equally scarce, and the troops had to submit to many privations. All the public property, in the shape of plate, books, and arms, having been collected, on the 17th the troops were withdrawn, and "Magdala, on "which so many victims had been slaughtered, was committed to the flames, "and now only remains a scorched rock."

The troops present at the attack on Magdala were in round numbers 3,470, of which 1,726 were Europeans, and 1,744 Native troops.

Return of the Expedition.

The object of the Expedition having now been completely attained, the troops began their retrograde journey to the coast by recrossing the Bashilo on the 18th April.

During the four weeks the expeditionary force was south of the Takazie, the troops were badly fed, chiefly, or perhaps entirely, in consequence of failure of the Native transport, by which supplies for the front were intended to be

forwarded from Antalo and intermediate depôts. During the time mentioned they were almost entirely deprived of such necessary articles as biscuit, rum, sguar, ghee for cooking, compressed vegetables, tobacco, and lime-juice. Abyssinian beef, which every expeditionist will remember to the latest day of his life, was extremely poor, hard, and tough, and the ration of it was now increased to 2 lbs.; and in place of biscuit, native flour (a mixture of wheat, barley, and bajree) was issued and made into chupatties. "Gogo," a coarse kind of Abyssinian bread, also made of this flour in the form of thick circular cakes, was at this time largely used by the troops; but it was insufficiently baked, and proved very indigestible.

The portion of Abyssinia through which the Expedition travelled was extremely poor, produced no vegetables of any kind, eggs and fowls were scarce and dear, butter, milk, or honey were occasionally procurable, and the last was often used as a substitute for sugar. Mutton was sometimes issued instead of beef, but less frequently than the numerous flocks of sheep seen in various parts would have led us to expect. The reason assigned for this was the unwillingness of the people of the county to part with their sheep. Lime-juice, in consequence of the scarcity of transport, was seldom issued to the troops on the advance to Magdala, but on the return march it was issued regularly. The hardship of being restricted to such poor and monotonous fare as beef and flour was beginning to tell sensibly on the health of the troops, bowel complaints were on the increase, and every man felt that he was losing strength and substance; when fortunately the Takazie was arrived at, and the depôt of commissariat stores found there gave new life to every one. With better rations, and the luxury of a dram of rum daily to qualify bad water, and assist the digestion of tough beef, the troops rapidly improved in health; but the muleteers, dhooly-bearers, and other public followers who had been exposed to greater hardships than fighting-men, continued sickly, and suffered much from wasting bowel complaints; and as we came along, large numbers of them were picked up and carried on, for none could be or were left behind in the country. By the time the Expedition had returned to Senafe on the 24th May, the sick in camp amounted to nearly 300, and of this number about three-fourths were natives, chiefly camp followers.

Though this (April and May) was the hot season of the year we found the climate of the highlands delightfully cool and pleasant. In another part of this report, I have adverted to the scanty supply of water, which the province of Tigré generally afforded. In Lasta water was more abundant, small mountain streams were frequently met with, and the quality of the water was generally good. On the Wadela and Dalanta plateaux, the supply of water was exceedingly scanty, and in point of quality even worse than in Tigré, while at Magdala water was obtained with much difficulty from muddy pools, and the quality it is needless to add was exceedingly bad. It is true that every soldier was provided with a pocket-filter, but I fear they were not often or generally made use of.

Before taking leave of the highlands of Abyssinia, I may observe that the inhabitants, though extremely poor and mercenary, were uniformly civil; they are proud of the distinction of being Christians, and never fail to display the blue cord, the emblem of their faith, which they wear round the neck.

In features the Abyssinians do not differ much from the Mussulman Shohos on the seaboard, and though the national costume, if it deserve the name, is somewhat different; they are equally dirty in their persons, and this will readily be believed, when it is mentioned that their ablutions are only performed once a year, viz., on St. John's day.

The men are of middle stature and thin, for I never saw a stout Abyssinian, or one approaching to obesity, and they either wear no beards, or short beards and whiskers, and the hair sometimes short, but oftener long and plaited in thick rows over the head, and tied behind. A pat of butter in process of liquefaction is often seen on the head, but whether it is put there for an ornamental or useful purpose, I never heard.

The women, whose looks are passably good, wear their hair in much the same style as the men, sometimes short, but more frequently long and elaborately plaited.

The leathern petticoat so universally worn, though probably a durable, is by no means a becoming garb.

The child is always carried on the back, with its small head projecting out of a leather bag.

Abyssinians use animal food largely, both in the raw state, called "brundo," and also cooked. "Gogo," a heavy kind of bread, made of mixed flour, is eaten with butter and red pepper. The more aristocratic bread, called "teff," is light and spongy, this is also eaten with red pepper. The national drink is "tej," fermented liquor made from honey, and which is rather pleasant to the taste, something between cider and ginger beer.

When the force had returned to Senafe in the end of May, Kassai, Prince of Tigré, came there from Adowa for the purpose of paying his respects to the Commander-in-Chief, and seeing our troops, &c. This chief, who might have disturbed our communications in his territory, where our line was weak, was now rewarded for his friendly conduct by receiving large presents of arms and ammunition, some mortars, and a battery of mountain guns.

Soon after the advance column began its retrogade march towards the coast, orders were given for the re-embarkation of the stores and munitions of war which had accumulated at Zoolla, and the troops at that end of the line began to embark on the 15th May.

The European portion of the force, consisting of four companies of the 45th Regiment at Antalo, 26th Cameronians at Addigerett and Senafe, and 5th Battery 25th Brigade Royal Artillery left early, and were amongst the first to embark.

The Magdala troops marched down from Senafe by columns daily, and on arriving at Zoolla by railway, they went straight on board the transports allotted to the different corps. The embarkation was expeditiously conducted, and the last European detachment, viz., the 10th Company Royal Engineers, embarked on the 5th June.

It was very desirable to get the troops out of the country with the least delay possible, for the heat on the seaboard was then very intense. At Koomaylee, at the foot of the pass, the thermometer in tents stood at 114 degrees, and at Zoolla 106 degrees. Heat apoplexy was of frequent occurrence amongst the shipping, and several soldiers and two military officers were cut off by it.

A few native troops remained some time longer to enable the Commissariat and Ordnance Departments to remove the last of their stores, and on the 19th June, Zoolla was finally evacuated by the British.

Remarks on the Climate of Abyssinia.

Mr. Dufton, who was unfortunately killed by the Shohos in the Koomaylee Pass when returning to the coast with the Expedition, remarks in his book of travels in Abyssinia:—"Soldiers will not believe what a climate Abyssinia is, "until they have passed through the purgatory of the lowlands upwards, and "upwards to the paradise of the highlands." While admitting the correctness of the above description of the lowlands, I am not prepared to endorse to the full extent the opinion expressed in regard to the highlands; at the same time I have no hesitation in saying that the climate of the latter far surpassed our expectations.

Our experience of the climate extended over the cold and hot seasons, and though the sun was often too hot to be pleasant, its influence was so modified by the great altitude of the highlands, that it did not prejudicially affect health in the manner that a tropical sun usually does. I have already mentioned the great daily range of the thermometer in the cold months; but in April and May, which may be considered the hottest months, the range of temperature was much less, and the mid-day sun was not then sensibly hotter than it was in the previous months, when the nights were so intensely cold.

Our experience led us to the conclusion that Abyssinia was a healthy country for Europeans, and this opinion was formed under somewhat unfavourable circumstances, such as the hardships incidental to long and fatiguing marches, exposure to cold and wet, and the habitual use of bad water, and of coarse and indigestible food.

Fortunately our service in Abyssinia came to a close before the rainy season set in, but there was abundant evidence of the rainfall being very heavy; and

according to reports which we received malarious diseases were then prevalent, and especially near the large rivers.

Our Abyssinian experience did not bring us into contact with many of the dangers against which the Expedition had been duly cautioned by volunteer writers.

Sanitary Arrangements of Camps and Marches, &c.

The part of Abyssinia travelled over by the British force was probably more free, during the cold and hot seasons, from malarious influences, than would be experienced in most tropical countries of equal extent; and as the soil was peculiarly dry and stony, the difficulty discovered in selecting sites for camps had reference mainly to the supply of water.

With the exception of distilled sea water used at Zoolla, and the comparatively pure water obtained by means of Norton's American pumps in the Koomaylee Pass, and at a few posts on the tableland, the water used by the troops on the journey to Magdala was entirely surface water, drawn from stagnant pools or ditches, or less frequently from small running streams. Water so obtained was often muddy, or soon became so in spite of every precaution that could be taken for protecting the source of it, and contained more or less dissolved organic matter. But notwithstanding obvious impureness, the taste of the water was seldom unpleasant.

The Expedition was accompanied throughout by bheesties, or water-carriers, a valuable class of Indian camp followers, and by whom water was supplied to the troops.

Means for purifying water on a large scale were not available in the field. Filters, of which many were in store at Zoolla, were on account of their weight out of the question, and alum, which in India is employed for precipitating organic matter in water, would have required for general use a much larger amount of transport than was available. There remained only the small charcoal pocket filter with which every soldier was provided, and though this convenient apparatus answered the purpose well, I fear a larger amount of patience was required for its regular use than a thirsty soldier often cared to exercise after a fatiguing march.

The ration beef was invariably of poor quality, and as the animals were slaughtered in the morning before the day's march began, or immediately after arriving at the next encampent, meat so very fresh could not be otherwise than tough and difficult to make palatable by any amount of cooking.

Fresh vegetables were not procurable, and Chollétt's compressed vegetables, which for a time were pretty regularly issued, though somewhat tasteless, were wholesome when properly cooked. It was alleged, and perhaps with truth, that the dry vegetables had a tendency to induce diarrhœa, probably from mechanical irritation of the bowels; but I apprehend this only occurred when the vegetables were cooked without the necessary precaution being taken of first soaking them in water.

Preserved potatoes were issued for some time after the force arrived on the tableland, but the scarcity of transport necessitated the discontinuance of this and some other articles of food which had been provided for the Expedition.

After leaving the base of operations, the services of the Indian cooks were dispensed with, and the soldiers cooked their own rations.

The latrine arrangements were carefully attended to, trenches were dug to leeward of camp, and enclosed by stone walls; a little dry earth was thrown in occasionally, and on corps moving on, the trenches were filled up. The conservancy of camps was systematically carried out; dead animals and rubbish were removed and burnt, and on the force returning to the coast, clean ground, whenever available, was selected for camping the troops.

The length of the marches depended a good deal on the water supply; the distance usually did not exceed 12 miles, though it sometimes extended to 17 and 18 miles.

In a country where the mountains are both high and precipitous, it was desirable to make the length of the marches as moderate as possible, for the narrow and steep paths greatly delayed the progress of the troops, and in a still greater degree the baggage-animals.

As a general rule, the troops marched an hour or two after daylight, having first had hot coffee issued to them; and it may here be mentioned that native coffee of fair quality was often procurable. The breakfasts were cooked before starting in the morning, and carried on in the haversacks, and eaten during a halt on the march. Bheesties accompanied and supplied the columns with water, and every soldier was provided with a water-flask covered with canvas. The Cavalry insured a supply of water on the line of march, by carrying it in an elongated leathern bag, fastened in a peculiar manner under the belly of the horse, and officers carried water for themselves in leathern bottles, called "chajuls," attached to the saddle.

The arrangements for insuring a supply of water to the troops on long and fatiguing marches were under the circumstances tolerably successful.

On the march, the mules carrying the camp cooking utensils went immediately in rear of the column, and preceded all other baggage animals.

The Provost Marshal regulated the movement of the baggage on the line of march, and endeavoured, by strict orders, to prevent the narrow gorges and passes from becoming blocked up; but his arrangements were often frustrated by mules dropping down, or throwing their loads in inconvenient places, and thereby delaying the arrival of the baggage and supplies in camp, and occasioning a long fast, as well as a late and badly-cooked dinner.

The daily allowance of one dram of rum was drank after meals, mixed with water, and, in my opinion, the spirit ration was conducive to health, for, according to my observation, slight bowel complaints were vastly more prevalent during the three or four weeks that the troops were unavoidably deprived of their accustomed stimulus than at any other period of the campaign. Malt liquor was not issued to the troops, except at Zoolla. The weak native drink, tej, was not procurable in any large quantity, and soldiers had no opportunities of indulging in this or any other liquor to excess.

On the return march from Antalo to the coast, medical comforts, which were in excess of the requirements of the sick, and such other stores as had accumulated at the Commissariat depôts, were issued freely, and bread made in portable baking ovens was supplied to the troops.

The peculiar physical character of Abyssinia, and the consequent difficulties encountered in carrying a large force into the interior of a country so little known, rendered it necessary for the troops to submit to many discomforts and some privations; but as far as circumstances permitted, every precaution was taken to insure the healthiness of the force.

Remarks on the Prevailing Diseases and Wounds.—The average strength of the British troops of the expeditionary force during the 25 weeks they were employed in Abyssinia was 2,674, and, as will be seen on referring to the accompanying Summary Sick Return, the total admissions into the hospitals on shore were 1,332,—the latter being in the ratio of 49·81 per cent. to strength.

The total deaths in the force, including 12 which occurred amongst the transfers to the hospital ships, were 35,—equal to a death-rate of 1·30 per cent.

I may observe that though the figures above given show only the amount of sickness and mortality amongst the European troops, there was a remarkable concurrence in the prevailing diseases and extent of sickness and mortality between the European and Indian troops. The only notable difference was, that while the former did not suffer from scurvy at all, the latter did so, but to a small extent only.

The prevailing diseases amongst the troops were confined to fevers,—chiefly intermittents,—and bowel complaints. The former accounted for 260 admissions, or in the ratio of 19·51 per cent. of the total sick admitted: and the latter for 343 admissions,—equal to 25·75 per cent. of thet otal admissions.

It thus appears that to fevers and bowel complaints were due nearly one-half of the whole admissions into hospital.

It is impossible to state with any degree of accuracy, what number or proportion of the cases of intermittent fever originated in Abyssinia, or were relapses of the disease previously contracted in India, from which every corps had come direct. It is probable there were many of both classes; at any rate, it is certain that the great extremes of temperature,—cold nights and hot days,—were eminently calculated to produce relapses of this disease.

But the diseases of greatest prevalence and fatality in Abyssinia were bowel complaints, either in the mild form of diarrhœa, or dysentery. As already mentioned, 343 admissions were from bowel complaints; and of the 35 deaths from all causes, 18 resulted from dysentery.

I was not able to ascertain whether the natives of the country suffered much from bowel complaints; but the prevalence of this class of diseases was not confined to the European portion of the force, for it was observed that the Indian troops were affected nearly in the same proportion.

The only peculiarity worth mentioning regarding the dysenteric form of the disease was the rapid progress of bad cases to a fatal termination, and in all such, dissection revealed ulcers in advanced state of sphacelation.

It seems probable that the prevalence of bowel complaints amongst the troops was attributable to a combination of causes, the more efficient of which were, great alternations of temperature, bad water, and coarse and insufficiently-cooked food.

Tænia.—That tapeworm is very prevalent amongst the inhabitants of Abyssinia is beyond all doubt a well-ascertained fact, and they themselves believe that the great prevalence of this parasite is due to one cause, viz., the habit of eating raw beef, or "broundo," and this opinion appears to be corroborated by the fact of nearly all the European prisoners who indulged in this habit having suffered from tapeworm.

Raw beef is eaten by every Abyssinian either immediately after the animal is killed, and the flesh still warm, or not more than 24 hours killed; meat that has been longer killed is cut up into long sausage-like strips, dried in the sun, and cooked.

The cases of tapeworm which occurred in the expeditionary force were not numerous, and as all the troops had come direct from India, where tapeworm is common, it was impossible to say whether the cases of it which came under observation were of Indian or Abyssinian origin. A certain length of time, no doubt, is necessary for the development of the parasite, and it is probable, therefore, that more cases of it may have occurred after the breaking up of the field force.

With reference to the origin of tapeworm, it may be remarked that the ova of the parasite, which some observers in India report having seen in ration beef there, were not detected in the beef used by the troops in Abyssinia.

In the expectation that tapeworm would eventually become prevalent amongst the troops serving in Abyssinia, a liberal supply of the ethereal extract of the root of maleshield fern was sent out by overland.

This was done on the recommendation of Professor Christison, of Edinburgh, who has long entertained a high opinion of the tænicide properties of this preparation of male fern; and it is satisfactory to be able to state, that our limited experience of it in cases of tapeworm was strongly favourable to its reputation as a safe and certain anthelmintic.

Dracunculus is another animal parasite which we were led to believe would likewise become prevalent amongst the troops in Abyssinia, at any rate if the service should happen to be protracted there; but during the 25 weeks which the campaign extended over, no cases of it were observed, though a few, probably of Indian origin, were seen amongst the camp followers. I possess no reliable information in regard to Guinea-worm among the natives of the country.

Insolatio.—In the months of April and May the heat at Zoolla and Annesley Bay was very intense; and cases of heat apoplexy were of frequent occurrence, amongst the shipping more especially, and two military officers and six soldiers succumbed to it.

Venereal Diseases were reported to be prevalent in the country, and though I myself cannot speak of them from personal observation, I have no reason to doubt the truth of the statement. Amongst the troops a small number of cases of venereal disease were contracted from native women. Fortunately the camps were generally at a considerable distance from the villages, and the soldiers had but few opportunities of visiting them.

Sickness and Mortality amongst Officers.—In the Memorandum appended to this Report, the deaths of 11 officers are returned; and from this large number it might be inferred that sickness had prevailed to a large extent amongst the commissioned grades, but in reality this was not the case: on the contrary,

officers generally enjoyed a remarkable immunity from sickness; and their ailments, with few exceptions, were of a mild and ephemeral nature.

The individual casualties in the return need only be briefly noticed. The two first occurred before landing in Abyssinia: one from accidental drowning on the voyage thither, and the other from apoplexy in Annesley Bay. The two last that took place were from heat apoplexy, immediately before the re-embarkation of the force in June.

Seven deaths took place on the table-land. A case of dysentery, which terminated fatally on the Dalanta plain near Magdala, was brought on by over-exertion and fatigue, and exposure to wet; and the two deaths from disease of the heart occurred almost suddenly.

A young officer of Engineers, whose duties caused him to be much exposed to the sun at Magdala, died of a low kind of fever with cerebral complication at the Tekazzie River, on the return march to the coast.

The death under the head of hepatitis resulted from abscess, and took place at Senafe on the advance of the Expedition. Two deaths from violence resulted from gunshot wounds: the one inflicted accidentally, and the other designedly.

Wounds.—The surgical history of the campaign is easily told. In the actions on the 10th and 13th April, 17 Sepoys were wounded. The most of the wounds were of a slight nature, excepting the cases of two men who were shot in the abdomen and pelvis, and both eventually proved fatal.

Amongst the European troops, two officers and 13 soldiers were wounded. Of the former, one sustained a slight and the other a severe injury from a musket-ball passing through and fracturing the bones of the left elbow-joint. An attempt was made to save the limb, and for a time with fair promise of success, but the circumstances were unfavourabl·: the daily marching and motion of the dhooly, over rough roads and steep mountains, lighted up inflammation in the seat of injury, and it became necessary to amputate the limb. When this officer embarked for England, the stump, though not quite healed, was doing well.

One soldier was shot through the arm, breaking the humerus about its centre. This case did well without operation. Another man was wounded in the head by a spear, and three others were shot through the lower extremities by musket balls.

A Memorandum will be appended to this Report showing the sickness and mortality in the European force during the entire campaign.

Invalids (333 men, equal to 12·45 per cent.) were sent home. Of this number upwards of 200 men were sent to England by the overland route in the month of March; and the remainder, consisting partly of invalids of corps returning to India, and partly of sick and weakly men whose corps were going home overland, were sent round the Cape in one of the hospital ships at the close of the campaign.

The climate of Zoolla was so trying to health that every soldier who was sick, or too weak to proceed to the front, was sent away as s on as possible. A large proportion of the men thus sent home for change of climate will shortly rejoin their corps.

Hospital Ships.

Before concluding this Report I will add a remark or two about the hospital ships, "Golden Fleece," "Mauritius," and "Queen of the South."

These fine large steamers were fitted up in England for hospital ships in an admirable manner, and the accommodation which they afforded was very good. Though reported to be capable of accommodating 420 sick in cots, and 184 in hammocks, the former number was quite as large as they could comfortably accommodate in a tropical climate.

The cot on the single tier and swinging principle is a great improvement on the bunks with which the hospital ships sent to China in 1859 were provided.

In the Abyssinian Expedition the hospital ships were simply invaluable, and the sick had the benefit of everything that could possibly minister to their comfort.

As hospital ships now form an important part of the equipment of every

Expedition, I trust I shall not be thought hypercritical if I endeavour to point out in what respects these ships, in my opinion, were not altogether satisfactory. I am aware it can be shown that their ventilation was amply provided for by several distinct and separate systems, and no doubt it was sufficiently so for a temperate climate; but for an intensely hot place like Annesley Bay in the Red Sea, something more active than mere ventilation is required.

Punkahs agitate the air, but they alone are not sufficient to supply the want. Some kind of appliance more powerful than any with which these ships were provided is required, and capable of producing a current of air (if cooled so much the better) sufficiently strong and generally diffused as to make a decidedly cooling and refreshing impression on the feelings of the inmates. An apparatus on the principle of the Indian thermantidote, if properly constructed, would have this effect; and in my opinion it would be desirable to supply hospital ships destined for service in tropical climates with an appliance of this kind.

MEMORANDUM showing the Amount of Sickness and Mortality in the British Troops, Abyssinian Expeditionary Force, during the entire Campaign.

Average strength	2,674
Total admissions	1,332
Ratio per cent. admissions to average strength	49·81
Total deaths	35
Ratio per cent. deaths to average strength	1·30
Total invalided	333
Ratio per cent. invalided to average strength	12·45

CASUALTIES.

Officers	Highlands	7
	Lowlands	4
	Total	11
Men	Highlands	17
	Lowlands	18
	Total	35

OFFICERS' Deaths caused as follows:—

Diseases.	No.	Remarks.
Dysenteria, acuta	1	
Febris cont.	1	
Apoplexia	1	
Morbus valv. cord.	1	
Hepatitis acuta	1	
Angina pectoris	1	
Submersio	1	Accidental drowning.
Insolatio	2	
Vulnus sclopetarium	2	One accident, one suicide.
Total	11	

MEN'S Deaths.

Diseases.	No.	Remarks.
Dysenteria acuta	16	
,, chronica	2	
Febris remittent	2	
,, typhoid	1	
,, continua	1	
Paralysis	1	
Aneurism	1	
Hepatitis acuta	1	
Nephritis	1	
Nephria	1	
Insolatio	6	
Vulnus sclopetarium	1	Suicide
Venenatio	1	Over dose of chlorodyne from private supply.
Total	35	

DISTRIBUTION of Casualties by Corps.

Corps.	Officers.	Men.
Royal Artillery	1	5
Royal Engineers	1	2
3rd Dragoon Guards	..	2
1st Battalion, 4th (King's Own Royal) Regiment..	1	11
26th (Cameronians) Regiment	..	3
33rd Regiment	3	4
45th Regiment	1	8
Medical Staff	2	..
Military Stores Staff	1	..
Veterinary Staff	1	..
Total	11	35

APPENDIX No. VII.

MISCELLANEOUS CASES FROM THE CLINICAL RECORDS OF THE MEDICAL DIVISION, ROYAL VICTORIA HOSPITAL, NETLEY.

By Professor MACLEAN.

Diseases of the Heart.

THE Royal Victoria Hospital was opened for the reception of sick on the 10th of March, 1863. Between that date and the 10th of March, 1869, 22,625 invalids have been admitted from abroad, the vast majority being from India. Of this number 1,635 were sent home unfit for duty from disease of the heart. Of the cardiac cases, 24 died at Netley, 1,322 were discharged the Service, 276 returned to duty, and 13 remained on the 10th of March, 1869. The greatest number of cases returned to duty proved to be functional derangements, due to a general anæmic condition, the result of service in malarial localities, the abnormal sounds and irregularities disappearing under an improved state of the general health, brought about by change of climate, rest, good diet, and the use of the preparations of iron.

The number of cases classified under the head of Valvular Disease is very large, amounting to 1,129. It is therefore necessary to explain that many of the cases under this head ought, strictly speaking, to have been placed under the head of *Palpitation;* but as no such term was included in the old nomenclature they were classed with diseases of the valves. In all subsequent returns, under the new nomenclature, cases of this description will be properly classified.

I think it right, however, to observe that palpitation of the heart, when developed to such a degree as to warrant discharge from the Service, is often a greater disability for military service than even valvular disease, at least in the early stage of that affection. It often happens that soldiers have loud heart murmurs without being conscious of much or any inconvenience, except under severe exertion; but palpitation causes distress, and at once disables a soldier from the performance of his duty.

This condition is almost invariably attended with dilatation of the right side of the heart. It is observed chiefly in delicate lads, and is often established in an extreme degree after a few years', sometimes after a few months', service. Once fairly set up, I doubt whether it is ever really cured. I have kept young men under observation for months, under the most favourable conditions as regards rest, diet, and medicine; but on causing them to resume their ordinary dress and accoutrements, or to walk quietly about the corridors of the hospital, distressing palpitation immediately returned, making further exertion impossible.

A considerable number of cases are sent to Netley from all parts of the world under the head of *Carditis*. On examination, they prove, for the most part, to be cases of palpitation. It is to be hoped, now that a more comprehensive nomenclature has been sanctioned, this extremely inaccurate heading will disappear from our returns altogether.

Taking 151 cases of heart disease from our clinical records, 82 were under 30 years of age, and 39 between 30 and 40, the two extremes being 16 and 40.

It is a notable fact that in only six cases had the patients suffered from acute rheumatism—a very sufficient answer to some who, without having been at the pains to enquire, or indeed without the means of doing so, have endeavoured to discredit those who for some years past have been inviting attention to the true cause of the suffering and loss from heart disease in the Army.

22 had a distinctly recorded history of syphilis, and in only one case was there evidence of a gouty diathesis.

In 72 the aortic valves were diseased, with more or less hypertrophy of the left ventricle, where the disease was aortic obstruction.

The mitral valve was affected in 54 cases; in 25 the cause of disability was palpitation, often with dilatation of the right side of the heart.

Aneurisms.—Between the 10th of March, 1863, and the 10th of March, 1869, 93 cases of aneurism of the aorta were admitted into the Royal Victoria Hospital. Of these seven died in hospital, and the remainder were discharged the Service.

Between the 1st of April, 1867, and the 1st of April, 1869, 36 cases of aneurism of the aorta were under treatment in the clinical wards at Netley. 26 were from India, 8 from North America, 1 from the Cape of Good Hope, and 1 from New South Wales; 18 were under 30 years of age, and 18 between 30 and 40. The youngest was 16, the oldest 40 years of age. The former was a lad invalided from India for headache following sunstroke; he fell down one of the hatchways of the transport, and to this he attributed his chest symptoms. The Medical History Sheet showed a rheumatic history in 5, and a distinct syphilitic history in only 3 of the cases. In 25 the disease was in the thoracic, and in 11 in the abdominal aorta. A very notable fact in the above figures is the early age of the patients affected both with heart disease and aneurism of the aorta. I doubt whether, out of the Army, so many cases of organic disease of the heart (not having a history of rheumatism), or of aneurism of the aorta, could be found at the above ages out of a proportionate sick population in any civil hospital in this country. I do not think there is now much difference of opinion among Army Medical Officers who have enquired carefully into the causation of this large amount of suffering and loss by invaliding. The evidence furnished from this hospital, and the careful enquiries of the Pack Committee, point unequivocally to dress and accoutrements as the active agents in this distressing amount of mischief. The Pack Committee have, I believe, solved both the mechanical and physiological problems submitted to their consideration. So long as it is thought necessary to make the soldier carry what he is now required to do, I believe it would be impossible to dispose of it to more advantage. As the new system of accoutering the soldier can only be introduced gradually into the Service, it will be some time before we can expect to see any marked diminution in the number of cases of heart disease. I have thought it advisable, therefore, to place the above facts and figures, collected in the largest invaliding hospital in the kingdom, on record for future comparison.

I cannot pass from this subject without doing justice to the memory of a highly meritorious Medical Officer, the late Staff Surgeon R. H. Hunter, formerly of the 2nd "Queen's" Royal Regiment. This officer was the first, as far as I know, to direct attention to the true cause of the prevalence of diseases of the heart and great vessels in the Army. In the 1st volume of the "Transactions of the Medical and Physical Society of Bombay," there is a paper by this gentleman, entitled "Cases of Cardiac Disease and Tubercular Phthisis occurring in the Queen's Royal Regiment." In this paper Dr. Hunter thus expressed his views:—"Ever since I joined the 2nd Queen's Royal Regiment "in Colaba, in 1831, I have been struck with the frequency of cardiac and "aortic disease. At first I thought it might be connected with the same "morbid state of the blood which gave rise to purpurea, so frequent at that "station; but it afterwards prevailed to an equal extent in Poona, where no "such cause could be assigned. Neither does it appear to be altogether connected with rheumatism, though certainly most frequently so; but whether "or not rheumatism be the first link in this morbid chain, a more sufficient "cause for hastening its progress, I am convinced, is the active duty a soldier "undergoes whilst buttoned up in his accoutrements. These, by compressing "the neck and chest, obstruct the circulation to such a degree as to excite the "heart to inordinate action, and cause great hypertrophy in the strong and "muscular, or to dilatation in the weak and sickly. Again, in the former the "natural resiliency of the aorta being overcome by the inordinate force of "the circulation, that vessel yields, dilates, and finally gives way, giving rise "to aneurism.

"It seems extraordinary that now the effects of tight lacing on females are "so well known, a soldier, intended for the most active and long-continued "exertion, should be placed in a similar predicament when that very exertion "is required. Is it possible he could be placed under more unfavourable "circumstances."

The above figures show a small proportion of cases of aneurism with a distinct syphilitic history; but experience has taught me to distrust the positive statements often made by soldiers on this subject. Again and again, at the *post-mortem* examinations here, "no syphilitic history" has been noted in the report of the case, yet the examination has revealed syphilitic lesions in internal organs of the most unequivocal nature.

The specimens of aneurisms of the large vessels in the Pathological Museum at Netley give abundant evidence of those organic lesions in their walls, which, as Dr. Davidson has so well shown in his paper on Atheromatous Degeneration of the Aorta, and its association with syphilis, are so frequently associated with the syphilitic cachexia.

I subjoin brief notes of a few of our cases of aneurism, with an abstract of the *post-mortem* appearances, abridged from the Post-mortem Register.

Aneurism of Thoracic Aorta, causing a Tumor under left Scapula; Rupture of Intercostal Spaces between 2nd and 3rd, 3rd and 4th, and 4th and 5th Ribs, with Dislocation of the 5th and Destruction of the Articular Surfaces of the 3rd, 4th, 5th, and 6th Ribs; Death from Hæmorrhage.

Gunner C. Armstrong, age 27, from Gibraltar, admitted 9th July, 1866; died 28th July, 1866.

Syphilitic History.

This patient belonged to a garrison battery, and was in the habit of working heavy pieces of ordnance, was repeatedly in hospital at Gibraltar, complaining of "pain in his chest, occasional attacks of dyspnœa, and cough." He also suffered there from rheumatism, continued fever, bronchitis, primary syphilis, and cholera. On the last occasion of his being in hospital at Gibraltar, on the 19th of April, 1866, he was in bed, when he suddenly became conscious of "something giving way under the left shoulder-blade, attended with a hot rush of something in the same place." He became faint, but on recovering a little, called for assistance; when the orderly came he discovered "a swelling under his shoulder-blade, which was beating."

State on Admission.—A large pulsating tumor projected from under the left scapula, displacing it outwards; this pulsated strongly, and expanded equally in all directions, with pain, sometimes very violent, in the chest, shoulder, and spine, requiring frequent sub-cutaneous injections of morphia to allay it.

The tumor went on enlarging till the 2nd of July, when he became weak and pale, with an intermittent pulse, and died very gradually on the 28th.

Post-Mortem Examination.

Chest.—Adhesions of old standing on both sides; left side of chest contained 25 ozs. of blood, part fluid, part in clots, which had proceeded from a large aneurism of the aorta.

Aorta.—Much diseased, its inner surface was thickly studded with cicatrical-like contractions.

There was a large aneurism of the ascending thoracic aorta, which extended from the third dorsal vertebra, which was deeply eroded, to the lower margin of the sixth rib, three inches from its attachment to the spine. The long diameter of the sac was directed backwards in the direction of the scapula. The rent from which the hæmorrhage proceeded was an aperture large enough to admit two fingers, situated in the depending part of the sac, on a level with the intercostal space, below the margin of the fifth rib. The intercostal space between the first and second ribs was intact, but in the space between the second and third, third and fourth, and fourth and fifth ribs, the finger could be passed through large openings into a sac as large as a child's

head, situated between the ribs and the scapula. This sac was filled with large clots, constituting the pulsating tumor observed during life. The third, fourth, fifth, and sixth ribs were deeply eroded for about 3 inches from their heads, the fifth was completely dislocated, and so dissected from the soft tissues that it was pulled out from its position without any of the soft parts adhering to it. The sixth rib was also partially dislocated.

Doubtless the "tearing sensation" and "hot rush" described by the patient were due to the giving way of the intercostal muscles, and the passage of blood between the ribs and scapula.

The intercostal muscles subjected to the pressure of the tumor had undergone the yellow degeneration usually observed under such circumstance.

The patient survived the *outward* formation of the tumor three months.

Aneurism of Thoracic Aorta; Death from Exhaustion; Clear Syphilitic History.

Private W. Mills, Cape Mounted Rifles, admitted 19th May, 1867; died 23rd May, 1868.

Suffering on admission from dyspnœa, palpitation of the heart, aphonia, and great pain in the chest and back. States that in 1856 he received a severe kick from a horse in the chest, and never did another day's duty.

Examination by laryngoscope demonstrated that the aphonia did not depend on disease of the larynx. Aneurism of the thoracic aorta diagnosed from the constitutional and physical signs, confirmed by the appearance, in March 1868, of a pulsating tumor synchronous with the first sound of the heart, at the level of the last dorsal vertebra. A distinct bruit was audible over the tumor. The aphonia increased, and the patient was much distressed by dyspnœa, dysphagia, and pain in the back, the latter symptom requiring the frequent use of the subcutaneous injection of morphia.

The tumor increased rapidly, exhaustion became extreme, with numbness of lower extremities. Death from exhaustion took place on the 23rd of May, 1868.

Lungs.—Left lung much consolidated. Right lung displaced by the aneurismal tumor; slight pneumonic infiltration of both lungs; lower part of left lung absorbed and adherent to aneurismal sac.

Pericardium considerably dilated, and filled with fluid of a sero-purulent character. Evidence of hæmorrhagic pericarditis and effusion of lymph on the surface of the membrane.

Heart pushed over to the right side, right cavities dilated, valves healthy, muscular texture soft and flabby.

Aorta much diseased, atheromatous degeneration commenced just above the valves, and extended not only as far as the aneurism, but also into the carotids.

Aneurism commences just below left bronchus, aorta opens into tumor by a valvular orifice near the middle of the tumor, passing for some distance beneath the inner coat. The tumor has dilated itself upwards, and to the left side and extends as high as upper margin of fourth rib, and downwards as far as last rib. It has expanded the diaphragm, causing a great distance between the aortic and œsophageal openings. The dilatation of the aorta extends as low down as the cœliac axis. The aneurismal tumor was the size of a large cocoanut, and contained coagula; œsophagus and pneumogastric nerve were pressed upon by the tumor. The whole posterior wall was made up by the vertebral column and ribs. There was erosion and softening of the three lower dorsal and first lumbar vertebræ, the ribs corresponding were dislocated and carious.

Aneurism of Thoracic Aorta; Habits intemperate; Distinct Rheumatic and Syphilitic History; Death from Exhaustion.

Private Michael Kenelly, Royal Artillery, age 34. Admitted 19th July, 186 ; died 5th October, 1867.

This man was invalided from Bengal, for rheumatism and asthenia. The

man's character was bad, his habits were intemperate, and he had done no duty for months before he was sent home.

On admission an aneurism of the thoracic aorta was clearly made out by the constitutional and physical signs—in fact, it was visible to the eye, in the shape of a pulsating tumor to the left of the sternum; absorption of the sternal ends of the second and third ribs having taken place, allowed a portion of the tumor, the size of a large orange, to protrude. The patient sank from exhaustion on the 5th of October, 1867.

Lungs.—Both adherent to each other and to the tumor, from which it was impossible to separate the right; posterior portion of left lung quite consolidated, from pressure of tumor.

Aneurism.—On removing integument from thorax, coagula were seen protruding through a large irregular opening, caused by absorption of the second and third ribs, near their sternal attachment. The sternum was removed, and the sac of a large aneurism thereby opened. The outer wall of aneurismal tumor was inseparably joined with periosteum of the sternum, and by pressure had caused caries of that bone. The site of the aneurism was in the anterior mediastinum, inseparably connected with both lungs and pericardium, globular in form, as large as a cocoanut; it sprung from the aorta, near the origin of the arteria innominata, from its anterior wall, communicating with the aorta by an aperture the size of a florin.

Limits,—as high as first rib, and rather to left of median line. Lined by firm decolourized coagula, sac very thick, composed of fibrous tissue.

Superior vena cava, inseparably connected with the tumor, which had also altered the course of the pneumo-gastric nerve and its branches, spreading them out over the sac.

Pulpy degeneration of intercostal muscles on left side; degeneration of cartilages of ribs, caries, and absorption of manubruim, and second and third ribs near sternal attachment.

Aneurism of Abdominal Aorta; Distinct Syphilitic History; Death from gradual Hæmorrhage.

Private John Smith, 88th Regiment, age 29. Date of admission, 7th May, 1866. Died 18th December, 1866.

Invalided from India for aneurism of abdominal aorta. On admission a pulsating tumor was found on the left side of the abdomen, near the umbilicus. When first observed it was the size of an orange, and had pushed its way upwards, inclining to the right. Afterwards it seemed to recede, and to press backwards, causing great pain of an intermitting character. From first the arterial nature of the tumor was well marked, the symptoms being impulse, corresponding with heart's action. Bruit distinct and constant, pain throbbing and at times plainly neuralgic, and very agonising, requiring the frequent use of the subcutaneous injection of morphia to make life endurable. The pain, limited to the abdomen, did not extend to the lower extremities.

Became gradually weaker, and died apparently more worn out by his sufferings than from hæmorrhage, which, however, had taken place gradually.

In this case there was no erosion of the vertebræ: the extreme pain from which the patient suffered was due to the stretching of nerve filaments across the sac.

Pleura.—Several pleural adhesions on both sides, and 24 ozs. of dark-coloured fluid were measured out of the thorax.

Lungs very anæmic; tubercular deposit in apex of left lung.

Heart normal.

Aorta much diseased; inner surface puckered, with cicatricial loss of substance.

Abdomen.—A thin clot of blood was found on the anterior surface of the stomach and omentum, and several large clots in the cavity. A large aneurism of the aorta was found taking its rise just where the vessel enters the abdomen. The sac was partly covered by the crura of the diaphragm, and was the size of a large cocoa-nut. A small rent was found on its posterior surface, the source of the hæmorrhage.

It is not necessary to multiply examples, they are all very much alike. The

26th of August, 1868, upwards of seven months. It is probable that in this case the cavity of the abscess is lined with a membrane which furnishes the discharge. No trace of hepatic tissue is now visible under the microscope.

This case contrasts with that of Johnson's (*supra.*), and illustrates the difference between the progress of a case where air has had free access to the cavity of an abscess, and one where air has been excluded. In the one case, although the patient had by no means so good a constitution, had been much pulled down by dysentery, and was altogether a more unfavourable subject, rapid, almost immediate, recovery followed the evacuation of the abscess. In the other, where air was unavoidably admitted, recovery, not yet complete, has been remarkably slow.

Carbolic acid in this case had not a fair trial; I had no opportunity of using it until free communication with the external air had long existed. Yet it did good, and certainly appeared to diminish the quantity of the discharge.

Where Bowditch's syringe is not at hand, it is certainly to be desired that Professor Lister's antiseptic dressing should have a fair trial in cases of abscess of the liver having an external opening. Professor Gairdner, of Glasgow, was good enough to send me notes of an interesting case of hepatic abscess occurring in the Glasgow Infirmary, which was successfully treated by Mr. Lister's method.

Abscess of the Liver; Discharging outwardly.

Serjeant Buchanan, age 37; Department of Public Works, Bengal; 17 years' service, of which 10 were spent in India. With the exception of a few attacks of ague this man's health was good, his occupation involved great exposure to the sun. On the 7th of November, 1868, he had a heavy day's work, and was exposed all day to a hot sun; he was much exhausted, and slept in a thorough draft of air during a cold night; awoke next morning with a sharp pain in the right side, with fever, and was confined to bed for six weeks. Finally an abscess of the liver pointed in the mesial line, two inches below the ensiform cartilage, and discharged a large quantity of purulent matter of a dark red colour. As the discharge continued for a long time in India, injections of nitrate of silver, and afterwards of tincture of iodine, were used; and as his health was much impaired, he was sent home. On arrival at Netley on the 17th December, the liver was found to extend downwards 2½ inches below the false ribs, the opening was discharging freely, and continued to do so for four months after admission, notwithstanding the use of the antiseptic dressing and great attention to his general health. The discharge has now almost ceased, and in a few days the patient will be discharged.

The site of this abscess was favourable, it is in the position that gives the largest number of recoveries, when the abscess is discharged through the abdominal parietes.

As I have elsewhere remarked, in the few cases of hepatic abscess that have discharged externally presenting themselves at Netley, the majority have the cicatrix where it was in this case—that is, in the epigastric region.

Enlarged Spleen.

In the Royal Victoria Hospital we have come to regard enlargement of the spleen, the result of malarial fevers, with little concern. Very rarely indeed does it happen that this condition resists the use of the ointment of the biniodide of mercury, applied over the enlarged organ in the same way as it is used in India for the cure of goitre. Since I first invited attention to this mode of treatment I have had every reason to be well satisfied of its efficacy. The biniodide is in daily use in our wards.

The following is a typical example:—

Private Jeremiah Murphy, 86th Regiment, age 28; completed 6½ years of service; invalided from the Mauritius; admitted 14th Oct., 1868.

During his four years of home service the patient had good health, the same subsequently at Gibraltar and the Cape of Good Hope. At the Mauritius he

was attacked by the prevailing fever, from which he suffered severely, having been in hospital there with intermittent fever at one time for 21 days, and after discharge "he often had two attacks in one day." It is reported that "his spleen enlarged enormously after every attack."

On admission this soldier was a perfect type of a man saturated with malaria. His skin was a dirty yellowish brown colour; what should have been the "white of his eyes" presented the same colour; his appetite was bad, he was languid, out of spirits, and incapable of any exertion. The spleen was enormously enlarged, reaching beyond the mesial line, and far into the pelvis, girth round the abdomen was 36½ inches. The left lung was pushed upwards by the enlarged spleen; lips, gums, and tongue almost white; heart sounds normal, but feeble. There was an enormous predominance of white corpuscles in his blood; the urine was red, deposited lithates, and contained albumen. Without taking up space with minute details, I may add that treatment in this case consisted in the external use of the ointment of biniodide of mercury, perchloride of iron, in full doses (which was occasionally changed for the syrup of the triple phosphates,—quinine, iron, and strychnine). On the slightest indication of a disposition to attacks of ague (of which he had several), quinine was given in 10-grain doses twice a day. Under this management, with a liberal diet, he soon improved; the size of the spleen diminished rapidly; in process of time the skin lost its unhealthy colour, his appetite improved; the attacks of ague ceased, albumen disappeared entirely from the urine, and slowly red globules took the place of white. The spleen finally returned to almost its normal limits, and this man, whose career as a soldier seemed on admission at an end, was discharged in very good health.

Sir James Simpson, Bart., having seen this case and several others from the Mauritius then under treatment in the hospital, advised me to make trial of a new drug, the nitrate of furfurine, a preparation from bran, which this eminent physician had found useful in similar cases. I procured a supply from Messrs. Duncan and Flockhart, of Edinburgh, and used it in this and several other cases of a like kind. It would be absurd after so limited a trial to speak with confidence on the claims of this new medicine. But this was the testimony of all the men to whom it was given, who had no preconceived notions on the subject,—viz., that when taken for a few days it improved appetite and digestion, and pleasantly stimulated the action of the bowels, almost always capriciously irregular in such cases. I have procured a fresh supply, and mean to give it a more extended trial in cases like this, withholding other remedies.

Nothing is more common than to find albumen in the urine of patients with enlarged spleens, and their systems charged with malaria; I have ceased to regard this with alarm, provided the urine is at the same time free from casts.

The albumen almost invariably disappears (as in this case) as the spleen diminishes, and the blood is brought into a more healthy condition.

Obscure Cyst in the Abdomen.

Private James Allen, age 30, 10 years' service; has served in England, India, Gibraltar, Cape of Good Hope; was sent to Netley from Port Elizabeth.

On admission a large tumor was observed in the left hypochondrium, proceeding from under the false ribs, extending beyond the mesial line, and downwards to the umbilicus; the swelling was smooth, painless, and elastic, and distinct fluctuation could be made out. The abdomen round the most prominent part of the body measured 38½ inches.

The patient arrived at the Cape of Good Hope, from Gibraltar, in April 1867; two months after landing he was obliged to go into hospital on account of occasional attacks of pain and uneasiness in the left side, in the region of the spleen. After a time a swelling appeared, and gradually increased in size; but whether the swelling proceeded from below, upwards, or from under the ribs, patient could not tell. No impression was made on it by blisters, or by local general treatment, and after being in hospital for five months he was sent home. His general health is fairly good, and the inconvenience he suffers from the swelling appears to be due more to its bulk and weight than anything

else. After careful examination, I came to the conclusion that it was a case of hydatid tumor of the spleen. On the 5th of June the cyst was evacuated by means of Bowditch's syringe, without the admission of any air. Eighty-six ounces of a dirty brown fluid of glairy consistence was drawn off. Sp. gr., 1,023·9; it contained an enormous quantity of albumen, becoming solid on boiling, or after the addition of nitric acid. A slight trace of chlorine and ammonia was detected, and under the microscope a few cells containing nuclei, with granular matter and some altered blood corpuscles, were visible. But no hooklets, although they were diligently looked for. After the evacuation of the sac, the limits of the spleen could be distinctly made out, scarcely, if at all, enlarged. On the 12th the patient complained of some uneasiness in the site of the former swelling, and it became evident that fluid was collecting again, now distinctly proceeding from below upwards, rising out of the abdomen from two inches above the level of the umbilicus, to the left of the mesial line, and tending upwards in the direction of the false ribs. On the 26th, 27th, and 28th, he passed several segments of tænia solium, and after the administration of a full dose of male fern, the complete worm, five yards in length, was passed. On the 30th, the tumor having attained to nearly its former limits, the operation of tapping was repeated with the same instrument: 46 ozs. of fluid, in all respects similar to the former, was drawn off. The sac was then injected with tincture of iodine, 1 part to 8 of water; 2½ ozs. of this solution were injected, an attempt was made to withdraw it again with the exhausting syringe, which failed; a good deal of pain, and even "shock," followed the operation, which, however, soon passed away after the administration of an opiate.

On the 17th of July, as there was no appearance of any return of fluid in the sac, and as the man's general health was good, he was sent to his depôt.

Soon after his return to duty, the fluid collected again, and he was sent to Netley, and admitted on the 4th of August; on the 10th, 20 ozs. of fluid, presenting in all respects the same characters as the first, were drawn off. A fourth operation was required on the 13th of September, when 30 ozs. were drawn off. On this occasion the fluid was darker, and contained a larger proportion of blood corpuscles. A second time he was discharged to duty to all appearance well.

From the date of his last discharge I heard nothing of Allen until the end of March, when I received a note from him, informing me that "his side was again troubling him," and that the "swelling was gathering." I applied to have him transferred to Netley from Parkhurst. On admission, on the 1st of April, 1869, I found some swelling in the old site, but no distinct fluctuation, sufficient at least to warrant any surgical interference.

The man declared his inability to serve, and insisted that he could not bear the pressure of his belts, or do his duty. I confess to some doubt on this point, but as it would be quite impossible to disprove his assertion, and as he had been often and long in hospital, it was thought best for the interests of the Service to discharge him.

I confess myself much at a loss to give any confident opinion as to the true nature of this case. My first impression was, that it was a case of hydatid cyst in the spleen, an opinion, I think, disproved by the examination of the fluid, the almost entire absence of chloride of sodium and the absence of hooklets, and by the fact that when it collected again it distinctly gathered from below upwards, and did not proceed from under the false ribs. The fact of the repeated collection of fluid in the sac, even after injection, also proves that my first opinion was wrong.

The view most in accordance with the facts is, that the fluid was in a pouch of the peritoneum, and was the result of some chronic inflammatory action in that membrane.

APPENDIX No. VIII.

CASES.

Case of Aortic Aneurism, with Remarks by Assistant-Surgeon Bredon, M.B., 97th Regiment.

Private C. N., 97th Regiment, a man of low stature, tolerably well built, of temperate habits, and of a generally steady character. In age reported to be about 38 years; old for a soldier, but specially so for one of his service, which was but little over nine years; had not suffered much from any organic or specific disease, though he had, during six or seven years' service in India, been a good deal in hospital with fevers of malarial origin. He had venereal disease once, but if it was genuine syphilis, it must have been, so to speak, in a comparatively mild form, as he bore no evidence of constitutional contamination, nor did his medical history record his having been under treatment for secondary disease. From the arrival of the regiment in England in June 1867, up to the date of his final admission in May 1868, he never had occasion to seek any hospital relief.

On the 5th May, 1868, he "came sick," rather under pressure than voluntarily, although he had been ailing for some two or three weeks; however, he did not consider that his illness was sufficiently serious to require him to leave his ordinary duty as an officer's servant; indeed, I ordered him to hospital in consequence of an officer who lived in the same passage as his master having told me "that one of the servants must be very ill, as his cough was most "pitiable and really distressing to listen to."

When admitted, I made enquiries into the time at which his symptoms first began to manifest themselves, and he stated, in reply, that he first felt anything of it on the day of the Volunteer Review at Portsmouth, the 14th of April; that on that occasion when doubling over some heavy ground with a party which was covering the advance of a battery at the foot of Portsdown Hill, he felt a peculiar straining and oppressive sensation in the upper portion of the chest. This sensation, the earliest symptom of his disease, was transitory, and the impression which it made on his mind appears to have been equally so, "as he thought no more about it," and completed the duties of the day. About 10 days after the appearance of this symptom, cough set in, and was accompanied with a considerable expectoration. When admitted, he appeared to be suffering from a subacute attack of bronchitis, and under that heading his case was classed. His breathing was then hurried and croupous, his skin was acting profusely, and he complained of pain and tightness across the upper and anterior part of the chest; he had a ringing cough, accompanied with the abundant expectoration of white semi-viscid sputum. On laying bare the chest for a sthethoscopic examination, the veins of the neck were observed to be somewhat distended, and small congeries of varicose venous capillaries were seen here and there over the front of the chest through a very fine skin. There was no appearance of a tumour.

On applying the stethoscope very loud raucous and sonorous râles were heard nearly all over the chest, back and front; they were intensified in an especial degree about the junction of the first and second sternal bones, in a situation which I believed to correspond pretty nearly with the point of bifurcation of the trachea. They were so loud as to prevent one hearing any vesicular respiration. Indeed, all the breathing was of a purely bronchial type, yet I was led to believe that the acuteness of the attack was confined to the larger tubes.

The case, as stated above, was entered as one of bronchitis, yet the condition of the veins of the neck, and the venous capillary congestion on the chest

(both more or less chronic conditions), combined with the character of the cough, which was loud and ringing, seemed to point to the existence of some cause, of which aneurism was a most likely one, for the bronchitis which was present being a secondary rather than a primary disease; at the same time, there was present no symptom on which a diagnosis of aneurism could, with any firmness, be founded.

This attack was treated, by the application of slight counter irritation to the chest and the internal administration of expectorants combined with sedatives. It had passed off in about eight days, by which time these loud râles, though still to some extent present, had become so far modified as to allow of a stethoscopic examination being more readily made. I proceeded, therefore, to examine the case with as much exactness as possible, bringing, I confess, to the investigation a strong preconceived idea of the existence of an aneurismal tumour, and the full impression that some further evidence on which to build up a diagnosis of that disease would be found.

The following report of this examination is taken from the Case-book, date May 15, 1868:—

On laying bare the neck and chest the veins of the upper portion are full and congested, even those of the capillary system of the skin appearing in minute congeries as low down as the epigastrium. The left external jugular stands out from the neck in bold turgid relief. Some loud sawing râles still exist in the upper portion of the chest, more especially over the first bone of the sternum; in this situation he complains of a sensation of tightness and constriction, and now and again feels a sort of internal beating. In this part of the chest an ill-defined area of percussion dulness exists. The heart sounds are natural in character, but weak, while as the stethoscope is moved upwards from the base towards the area above described these sounds become increased in force, and are occasionally heard accompanied by a peculiar creaking bruit, of which it was at first hard to say whether it was a bronchial or an aortic sound; it was, however, equally audible when respiration was suspended, a fact which went some way towards locating it in the vessel. It was only an occasional and by no means constant accompaniment of the other sounds, which appeared so closely to resemble the heart sounds as to almost give the idea of there being two hearts in the chest, the upper one the stronger, though perhaps least healthy. The voice was still hoarse and raucous; the cough not so troublesome but, in character at least, unaltered. He complained of dysphagia to a slight degree. There was no appreciable difference in the volume of the two radial pulses; both were weak. Both pupils were small, but neither seemed more so than the other, and the stimuli of light and darkness acted similarly on either. There is some dizziness in the head; he now and then becomes stupid, and a passing feeling of faintness comes over him. All this time there does not appear to the eye any sign of external pulsation, nor does palpation clearly detect any. I occasionally thought I felt some, and as often failed to find it. I had now, however, come to the conclusion that an aneurism was present, in which opinion Mr. Porter, Surgeon 97th Regiment, who a few days after rejoined from leave of absence, agreed.

The bronchitis from this time began to amend, and as it did the aneurismal sounds were heard with more distinctness, and the bruit, which had hitherto accompanied them, or rather the first of them, was heard at longer intervals. At this time the second centre of cardiac sounds, if the expression is allowable, is a little below and slightly to the left of the left sterno-clavicular articulation.

On the 23rd it is noted that he began to complain of starting pain up the right side of the neck as high as the occipital region. He also felt a peculiar heavy aching feel between the shoulder blades. Latterly he has been losing flesh a good deal.

In this condition he continued until the 8th or 9th of June, not having appeared to suffer in the least from a journey to Aldershot (which he accomplished lying along the seat of a second-class railway carriage), when the regiment moved to that station on the 1st June.

About the 9th or 10th the cough began to grow more troublesome, and fits of dyspnœa, sometimes amounting to complete orthopnea, came on in frequently recurring paroxysms. These gradually increased in force and frequency as

the case went on. He has been seen in some of them sitting with his head between his knees endeavouring to obtain relief. His nights became restless, his swallowing more difficult, and his appetite failed.

The dyspnœa increased in urgency, and the paroxysms became so severe as to lead an observer to imagine he could not get through such ones as he ultimately rallied from. The last of these, a very severe one, occurred on the morning of the 14th of June, and he got tolerably well over it, but on the afternoon of the same day he sank from pure exhaustion and weakness.

The treatment adopted has not been alluded to. It was of the most simple palliative kind, and was employed merely with a view of alleviating the symptoms as they arose, as it appeared from the very rapid course which the disease seemed to have run that it was not a fit one on which to try any of the fancy methods of cure.

A *post mortem* examination of the body was made 20 hours after death. The following appeared on dissection :—

On proceeding to lay open the thorax in the usual way by reflecting the sternum and costal cartilages, the bone snapped with a brittle fracture at about the junction of its upper and middle thirds. There was considerable vascularity of the bony tissue. There was also slight evidence of erosion of the back of the sterno-clavicular on the right side. The arsolar and fibrous structures covering the pericardium and filling the anterior mediastinum were in a state of sub-acute inflammation. The veins of the neck and upper part of thorax were much congested.

The right lung and its pleural covering were healthy to an extent seldom seen. It was a little congested behind, but that was apparently post-mortem. The left lung also was healthy in structure, but was attached through a considerable extent to the chest wall by bands of lymph, apparently the result of a recently pleurisy. The heart was perhaps slightly increased in size ; its muscular structure was firm, and but little, if at all, hypertrophied. The valves were free from disease, and the heart generally presented the appearance of a healthy organ. It had on its anterior aspect the usual "white spot," about the size of threepenny piece. The pericardium contained about four ounces of amber-coloured fluid. It showed no trace of disease.

On laying open the left ventricle and continuing the incision into the aorta an aneurismal tumor of considerable size was opened up to view. It was a little larger than a goose's egg. The wall appeared thick and firm, $\frac{1}{4}$ or $\frac{3}{8}$ of an inch deep, was composed of successive striæ of fibrinous deposit, and bounded a cavity which contained a good-sized clot of pure decolourized fibrine. There appeared to be within the cavity ridges of this deposit giving the tumour when explored internally by the finger quite a locular appearance. There were two of them distinctly marked. This locular condition was not observable on the outside of the tumor. This tumor communicated with the general course of the vessel by a large opening big enough to admit three, and almost four, fingers. The opening was long, its edges clean-cut, and was situated on the antero-superior aspect of the vessel. The tumor occupied mainly the transverse portion of the aortic arch, but took its origin in the end of the first stage. All the vessels which usually arise on the summit of the arch had their origins in the tumor.

In addition to the main aneurism there was a second nearer the heart. It was about as large as a moderate-sized walnut, and its junction with aorta was only about half an inch from the valves and immediately above the aortic sinuses. Its connection with the aorta was by a small opening, about as large as a swan quill, circular in shape, and with firm clean-cut edges. Its structure was firm and semi-cartilaginous, and the walls were formed of successive layers of fibrine intimately adherent to the walls and to one another, and almost filling up its cavity. Its structure suggested the idea of its having undergone a spontaneous cure, or at least to have so far advanced in that direction as that it had ceased actively increasing. It was situated to the right and front of the aorta, and was apparently related anteriorly to the pulmonary artery and edge of right auricle. It was on a plane below and slightly in front of the main tumor, but was wholly free from any connection with the latter.

The large tumor was behind intimately related to the trachea and œsophagus, the former of which was apparently much influenced by the pressure of it on the tip of the epiglottis down to the bifurcation of the bronchi, and even

into them, it was in every stage of congestion and inflammation, even as far as ulceration. One ulcer existed on its anterior aspect. It had raised edges and was surrounded with some inflammation. It did not appear to be produced by direct pressure, as it was some way from what appeared to be the point of contact of the trachea and tumor.

The œsophagus, although intimately related to the aneurismal sack, did not show any signs of injury from the connection.*

The liver was somewhat enlarged, and in common with the other abdominal viscera, congested, but no evidences of disease existed beyond those above detailed.

The above case appears to possess several points of clinical and pathological interest, and among them the following appear worthy of note :—

1. Is it possible that the aneurism took its origin at the time when he first felt any symptom of its existence, or was it actually progressing at that time and only then first showed signs of its presence. It is undoubtedly true that frequently the origin of aneurisms has been traced to some sudden and accidental cause; and if so could it be possible that one or both of these tumors commenced on the occasion referred to and finished their course in such a comparatively brief period, under two months?

2. The existence of a second aneurism is apparently most peculiar and very rare, at least there does not appear to be any mention of such a circumstance in any case which is recorded. It is an interesting question to consider what, if any, influence its presence had on the production of a bruit during the course of the case.

3. In the present case there were few of the distal symptoms of aortic aneurism, no eye, no pulse, no relative pulmonary symptoms. It seems as if this were to be accounted for by the directly mesial course which the larger tumor had taken, pressing equally on all the sources of arterial supply to the extremities, equally on the nervous ganglia, and by its pressure on the trachea itself similarly on either lung.

4. The presence of a bruit, and the fact of its being an intermittent one, appears to add a special interest to this case.

That there should be a bruit in an aortic aneurism is believed by the Irish school of physicians to be a decidedly exceptional case, although the dictum is disputed by many practitioners, who look for its presence as a signum pathognomonicum of the disease. In all the cases which I have seen, both in civil and military life, there was never any present except in this case. The question, therefore, very naturally occurs as to what was the cause of its production in this particular case, and, further, to what this symptom depends upon when it is present as an adjunct to the more natural sounds in any aneurismal tumor.

At first sight it would appear, in this instance, to have been produced by the circulation through the first tumor; but if so one would expect that its circulation would give equally with the other a double though perhaps a feebler sound, such was not, however, the case. The bruit was single and the second sound heard over the large tumor was clear and distinct. It was the first which was accompanied by the bruit. Again, the bruit was not more audible at the seat of the smaller tumor as it might be expected it would be if it had its origin there, while, finally, the bruit was intermittent, and why should it be so if the source from which it sprung was permanent and constantly in action? It may be inferred, therefore, with some show of probability that the principal aneurism was chargeable with the production of the abnormal sound, and in it its cause should be sought.

Remarks on such, therefore, would be equally applicable to many, indeed most, cases where bruits were present as a symptom of aneurismal tumors. It is generally believed that what has been throughout this paper called the normal aneurismal sound is produced by a circulation of the blood through the tumor; that these sounds have their character influenced or indeed made by certain natural actions in which the sack wall is an active or a passive agent, and that in all cases these normal sounds have a close similarity one to the other and occur according to more or less fixed rule.

Now it is generally seen that in character, and partially in cause (blood

* There was some puckering of the living membrane of the aorta beyond the tumor, but no active disease.

motion), that aneurisms and the heart have each a circulation which bears a moderately close analogy one to the other. It will not, therefore, be on the whole going much too far to go over some details of comparison between the two, and as the healthy heart has its normal rythm, and the typical aneurism its natural sounds, to inquire whether it may not be possible to obtain from the symptoms of the known derangements of the heart and the causes on which those symptoms depend, a general idea of what are the pathological conditions on which variations in aneurismal sounds depend.

(*a.*) The character of the opening through which blood issues influences the sounds which it produces; excrescences on the cardiac valves produce bruits. It i snot, therefore, possible that a narrow opening, a rough edge, or a fibrinous deposit overhanging the aperture may vary an aneurismal murmer. The latter being a not wholly improbable hypothesis in the present instance, as one knows that such is not necessarily a permanent obstruction.

(*b.*) Has the condition of the inside of the tumor any influence in producing variety of sound? Can the existence of a fibrinous ridge across its wall act as an impediment to the circulation through it, or may it be supposed that the trachea, not a very yielding tube, may be so pressed on by a thin-walled tumor as to raise itself up as a similar obstruction on its inner aspect?

(*c.*) Finally, it may be possible that the stage to which the disease has advanced may make a difference in the sounds. The tumor may have so large an opening in its later stages as to make the tumor simply an offset, causing or increasing a curvature in the vessel, and having its circulation rather a part of, than separate from, the ordinary channel of the blood.

Case of Aneurism of the Arch of the Aorta. By Staff-Surgeon Hyde.

Private A. B., 2nd Dragoon Guards, 30 years of age, and of 10 years' service, was admitted into hospital at Canterbury on 15th September, 1868. He was then complaining of severe pains about his shoulders and in his head. On investigation, a pulsating tumor was found on the left side of the sternum, tender on pressure, affording a strong impulse, but no bruit. The size of the tumor, when first detected, is not stated. It is recorded that the left carotid artery beat with considerably less force than that of the right side, that the radial pulse of the right side was stronger than that of the left, and that the action of the pupils was equal.

Up to 19th October the tumor steadily increased in size and discomfort, all pain becoming merged and concentrated into it, and his appetite commenced to be capricious.

No indications of pressure upon the trachea, œsophagus, or recurrent laryngeal nerve, had become apparent, and the tumor remained without bruit. The pulse was 86. On November 23 some expectoration tinged with blood was noticed. By this time he had become very much emaciated, and the tumor had much advanced in size.

When he came under my care at Christmas, the visible portion of the tumor was hemispherical in shape, and measured 8 inches in every diameter on the tape being carried over its convexity, occupying almost the whole of the left front of the thorax, and extending beyond the median line so as to intrude upon the right side. The pain was not so severe as it had been a month or two previously. The voice was unaffected. There was no difficulty in swallowing. He was expectorating thick gelatinous mucus tinged with blood. Pulse 112, hard and wiry in right, smaller in left, radial. By the 20th January the expectoration had gradually assumed the character of venous-looking blood. There was generally a little of this in his spitting-cup every morning.

On 22nd January, at 12½ P.M., the patient was taken with sudden hæmoptysis. Florid arterial blood gushed from his mouth. I happened to be on the spot, and imagined that the long-expected hour had arrived. However, the gush of blood gradually subsided, further ejection of it being due to coughing, and at 1 P.M. the expectoration of blood ceased. He was then on the verge of dissolution, and his condition was as follows:—

The efforts to respire were distressing to witness, and they were accompanied by a gurgling sound audible at some distance from the patient. His counte-

nance was bloodless, and bathed with a cold perspiration. The pulse disappeared entirely from both wrists, and the extremities were cold.

I had no hope of further continuation of life then, for I did not know that the flow of blood from the tumor had stopped. I was under the impression that the cessation of the expectoration was due to want of strength to cough, and that the blood, as soon as it had distended the air-vessels and tubes, would rush freely again from the mouth, and, regurgitating into the right lung, kill him forthwith. But not thinking it right to forego giving the patient every chance even in this strait, I ordered a table-spoonful of strong brandy and water to be given him. He immediately commenced to rally. The brandy was repeated at frequent intervals, and in an hour or two he had cleared his bronchi, and was respiring calmly. Slight expectoration of blood continued for the rest of the day, but it was of the old venous hue. On the morning of the 24th spitting of arterial blood recommenced, and continued for about three-quarters of an hour. He revived again under the influence of brandy. The usual slighter expectoration of dark-coloured blood succeeded, and continued in slight amount till he died, worn out, at 9 P.M. on the 27th, five days after the tumor had originally burst.

The body was examined 14 hours after death.

It was emaciated.

The external convexity of the tumor occupied the left half of the front of the thorax, and replaced half of the right front wall also. On carefully removing the undestroyed portion of the front of the chest, the internal hemisphere of the aneurism was seen to occupy the upper two-thirds of the left pleural cavity, and a portion of the upper two-thirds of the right. The tumour was globular in shape, about 8 inches in diameter. It communicated with the front and under portion of the arch of the aorta by a wide round opening, 2 inches in diameter. The arch was dilated and prolonged. No trace of disease was to be found about its lining membrane or other coats. They were thoroughly normal, irrespective of the hiatus connected with the aneurism. The lining membrane, as well as the yellow elastic coats, could be traced round the smooth border of the opening to a small distance inside the wall of the aneurismal cavity. At the commencement of the affection there had evidently been bulging of the entire wall of the vessel before the inner and middle coats gave way. In fact, during its early existence, the aneurism must have been a true one. The sac contained to repletion coagulum, which at its periphery had undergone some lamination and decolorization. Their layers of true fibrine were here and there interposed between the coagulum and the wall of the sac. The lower portion of the left thoracic cavity was occupied by serum, and by the left lung, which was so gorged with the inspissated blood, from which the serum had separated by exosmosis as to resemble a large coagulum. The upper lobe of this lung was adherent to the under surface of the aneurismal wall. The periphery of the tumor was found entire, firm, and consistent, until the adherent summit of left lung had been stripped from the portion contiguous to it. The latter was then ascertained to be less coherent in structure than the rest of the sac, and to have opened into the lung at three sites.

The heart, healthy in structure, was situated on the right side of the thorax, having been pushed thither by the tumor. The right lung was congested, apparently from pressure.

The cartilages of the ribs on the left side had been absorbed, and the sternum and cartilages of the ribs on the right side had been pushed forward in front of the right flank of the protruding aneurism, with the coats of which they were intimately bound up.

Comments on the Case.—There are several very interesting points in this case :—

1. There were no laryngeal symptoms throughout, no irritation there, nor aphonia. The voice became weak towards the patient's latter end, but that was from general debility. The recurrent laryngeal nerve must have been involved in the mass of the superior surface tumor, which consisted of a large amount of organized exudation, matting the large vessels together and to the upper portion of the aneurismal sac, and rendering individual components, unless of large size, difficult to be made out. The track of the nerve must have

been considerably interfered with, and absence of symptoms of the condition probably was due to its having gradually adapted itself to its altering status.

2. There was no pressure on the œsophagus; at all events, the function of that canal was not interfered with.

3. So early as 23rd November, two months before final bursting, oozing of blood through the thinned and softened lower portions of the aneurismal wall had commenced into the adhering left lung. This symptom remained as a permanent feature, and was probably exosmosal, without actual aperture. The latter appears to have been delayed till the 22nd January.

4. Was there any valid justification for attempting to prolong the patient's miserable existence after the tumor had visibly given way?

Was there a minute chance, after the brunt of the hæmorrhage was over, of the diminished circulatory impetus favouring lamination of fibrine inside the tumor; and so, while the aperture of exit was temporarily plugged, forming the basis of natural cure? Who may say?

The tumor was enormous, and the definiteness of the impulse it afforded and the absence of bruit, demonstrated during life that it was almost entirely filled with fluid or partially coagulated blood, a diagnosis borne out by the result of the after-death examination. This condition and the size of the communicating aperture were unfavourable for the inauguration of natural cure. Still, after the 22nd, the impulse of the tumor was decidedly less.

5. It is remarkable that the patient should have lived five days after the giving way of the sac, and have died from general exhaustion instead of the immediate hæmorrhage. He died with the sac full of blood.

6. The absence of atheroma in the aorta coats deserves notice. This, if the patient had been a civilian, would have been especially remarkable, for in civil life aneurism is generally co-existent with degeneration of the arterial coats. But the proportion of cases of aneurism among a given number of persons is seven times greater in the army at home than in civil life. Now, we have no reason to suppose that the fatty diathesis is 11 times more frequent; and it will probably be evolved, as these cases are more observed, that numerous instances of aortic aneurism in the army are unconnected with any special pre-existing structural degeneration of the arterial system; that they frequently commence, under strain, as saculatea projecting pouches of the entire vascular coating, and that the aneurisms become false by the subsequent giving way of the inner coats of the sac, when the expansion of the latter has reached its utmost limit.

7. Digitalis was given during the earlier stages of the disease without benefit.

Case of Popliteal Aneurism cured by Compression, under the care of Surgeon Porter, 97th Regiment.

J. D., of the 97th Regiment, Æt. 29, service 10 years, of which eight were in India, of intemperate habits and general bad character, of slender frame, but strong and healthy looking; during his service in India suffered a good deal from intermittent fever. Has suffered from primary syphilis. In December 1867 received an injury of one of his legs while kicking at football, but does not remember which it was. On the 8th of November, 1868, was admitted into hospital complaining of pain in left knee, numbness of leg, stiffness and swelling in back of joint, and cramps in calf of leg on the slightest exertion. These symptoms commenced about a fortnight previous to admission, and steadily increased in severity. He was not aware of having received any recent injury of leg or knee. On examining the joints there was nothing wrong anteriorly, but posteriorly there was a soft pulsating tumor about the size of a hen's egg, and much of that shape, situated to the outer side of the mesial line of the popliteal space. There was a loud rough bruit, which ceased on pressure being applied to the femoral artery, as did also the pulsation. The circumference of the knee was 14½ inches, that of the right knee 13⅝ inches. The calf of the leg was swollen and slightly œdematose; there was no heat of skin or constitutional disturbance, and as it was

considered a suitable case of popliteal aneurism for compression, Dr. Carte's compressor was at once applied for, and while an instrument was being procured, the patient was prepared by having the bowels freely evacuated, the groin shaved, and a hard bed made down. At one o'clock P.M. on the 8th of November, an instrument not having arrived, a 3 lb. metal weight with suitable pad was placed on femoral artery, but it had little or no effect on the tumor. Signoroni's tourniquet was received (instead of Carte's) at half-past four P.M., and was placed on the limb, pressure being applied on the femoral vessel at the puper, but not to completely control the full current of blood. This pressure was kept up until half-past seven P.M., when he was unable to bear the pain and uneasiness it produced. It was therefore eased off the vessel for about half an hour, and again applied with less force than before. He allowed it to remain on until half-past three A.M., of the 9th, when he begged to have it removed; his wishes were accordingly complied with, and he fell asleep until half-past six A.M., when it was again applied, and remained on until half-past nine A.M.

On examining the tumour this morning the pulsation was much reduced, and it felt harder and more circumscribed; he felt very easy, and was anxious to assist in the treatment. The pressure was removed for about one hour, and again applied, but with less force, and he kept it on without intermission until half-past seven P.M., when the instrument was removed, and he was allowed a comfortable night. The circumference of the knee this afternoon was $\frac{3}{8}$ of an inch less than on admission.

Nov. 10.—Slept well. The pulsation in tumor continues; applied compressor at seven A.M., and kept it on till seven P.M., allowing the patient to ease it should the pain be too severe.

Nov. 11.—Had a very comfortable night; applied the compressor at six A.M., and removed it at seven P.M. There is still pulsation in the tumor, but it is slight.

Nov. 12.—Compressor applied as yesterday. The tumor is now felt to be very hard and well defined; the circumference of the knee is less.

Nov. 13.—Steadily improving; the tumor is perceptibly smaller; circumference of knee 14 inches. The compressor was again applied all day without inconvenience. The skin where the pad is applied has been frequently sprinkled with French chalk.

Nov. 14.—No pulsation can be felt this morning; the tumour is hard and solid to the touch. A small artery can be felt on the surface of the tumor, apparently under the integuments.

Nov. 20.—Pressure has been kept up daily since the 14th; he says he feels quite well, and has no pain or uneasiness. The calf of leg is reduced in size; removed pressure altogether.

The total number of hours the compressor was kept on before solidification of tumor was effected appears to have been 75, extending over a period of six days, during which time the patient was but little inconvenienced, and with the exception of one night had comfortable and refreshing sleep.

During the process of compressure he was kept on low diet. The limb was kept warm, and the weight of the bed clothes removed. His bed consisted of the usual hospital cot with the leaf of a table placed on it and a hair mattress, which prevented the instrument shifting by his sinking, which he was found disposed to do when on the canvas bottom.

He steadily improved; the tumor became gradually smaller; the numbness of leg disappeared, and he was discharged from hospital to duty on the 8th of December, 1868.

A Case of Cerebro-Spinal Meningitis at Belfast, 4th December, 1868. *By Surgeon Bartley, 54th Regiment.*

A healthy strong boy, aged 2½ years, the eldest child of Serjeant S——, 12th Lancers, was reported sick at 10 o'clock on the morning of Friday the 4th instant; he was immediately visited by the Assistant Surgeon of the 54th Regiment, who states that he was apparently suffering from griping diarrhœa, being perfectly sensible, and in evident pain. He prescribed accordingly; about half-past eleven I was sent for, and found the child lying on the bed

in a state of complete insensibility; the pupils dilated and immoveable; the limbs extended and to some degree stiffened; the head moving from side to side, and the surface of the body rather cool, and of a dusky hue. There were no spots. The child was moaning and breathing with difficulty; the respiration being rapid, about 30; pulse, 110.

The parent's statement was that the child had gone to bed the previous evining in perfect health, laughing and playing. About five A.M. on the 4th he awoke, having had an involuntary evacuation, and shortly after vomited. The mother was not alarmed till the child had had two or three motions and complained of pain in the belly, some little time after which she applied at the hospital.

On seeing the case I at once considered it hopeless, but had the head shaved and a cold lotion applied, together with vesication behind the ears, sinapisms to leg, thigh, and abdomen, some calomel, and as much wine and water as he could be got to swallow. The insensibility continued, and he died at 3 P.M.

Autopsy 23 hours after Death.—Body, that of a remarkably fine, well-made and nourished child. Face pallid, but surface of body anteriorly very dusky, posteriorly of a dark purple, which colour had below invaded the anterior aspect of the feet and legs. On the latter, in front, there were some livid spots. These appearances were entirely *post-mortem* however, though developed within three hours after death, and due to the fluidity of the blood.

Head.—Great congestion of the vessels of the dura mater, the blood in the sinuses being remarkably liquid. The pia mater was much injected with a bright scarlet network. The superficial cerebral veins very turgid. The lateral ventricles contained a good deal of bloody serum, and the choroid plexus was dark and humid.

Spinal Column.—On removing the posterior wall of the canal great congestion of the vessels of the dura mater was observed. The pia mater traversed by longitudinal parallel, highly injected vessels filled with bright-coloured fluid blood. Between these the membrane was of a pale pink appearance. The posterior aspect was most congested. Nothing abnormal was seen in the chord itself.

The other viscera was not examined, as the friends were waiting for the body, the funeral being ready. I should have expected to find some congestion of the lungs and kidneys, with fluid blood distending the right side of heart.

After the death of the child the family were removed to another portion of the barracks. I made an inspection of the premises but could find no sanitary defect. The quarter consisted of two rooms, one on the upper story. It is at the corner of the row of buildings occupied by the married people, the serjeant's mess, &c., and at this situation there is an ordinary drain with an open grating. The trap in this sink is deficient, but I attach no importance to this, as nothing passes through it but an overflow of pure water from the horse trough, which is just above, at ash-pit elevation. This defect has been brought to the notice of the Engineer Officer.

The stables are behind the house, and also on its flank, they are in good wholesome order and the yard kept clean.

The latrines are at the opposite side of the barrack, and are on the pipe principle, flushed frequently. This pipe does not pass near the house in question.

Altogether the sanitary condition of the small cavalry square, though built on the old-fashioned plan, appear to me to be very good, and no complaints of any effluvia or nuisance could be elicited on enquiry.

As I do not recognise the drain as either infectious or contagious (though possibly atmospheric, and induced by some occult agency acting on the blood and then the nervous centres through the lungs), I abstained from appearing to further any idea of the kind as tending to produce a causeless feeling of uneasiness on the part of the next occupiers of the house.

The rooms were thoroughly washed, and ventilated by free currents of air, and the family, consisting of two younger children with the parents, removed. The premises were inspected and, as stated, nothing noxious discovered.

In the instances I had previously seen of this malady in Dublin, four in number, the disease had shown itself in isolated cases from different rooms

and parts of the barrack, and all efforts to establish an even remotely assignable cause were futile.

One case in a young soldier occurred (January 1867) in a hard frost, the ground covered with snow, and all miasmatic influences suspended. In a subsequent one the man, also a youth, was attacked in a different quarter of the barracks. The other two were those of a woman and child, no connection either in time or place existing between them.

Two Cases of Cerebro-Spinal Meningitis, with Remarks from the Special Topographical Report of Assistant-Surgeon James Wilson, M.B., British Demerara.

THE last disease I shall mention is cerebro-spinal meningitis. It presented several remarkable features, at least they were so to me, inasmuch as the disease was very sudden in its mode of attack, rapidly fatal, and the *post-mortem* appearances were widely different from those that were present in the published accounts of the disease, by the best authors, and in the cases which were occurring at the same time in different parts of Europe, and which subsequently occurred in England. As I am not in possession of the statistics of the number of cases of this disease admitted, and the deaths occurring, I cannot give them; but the general mode of attack, the symptoms, and the *post-mortem* appearances of two cases I have by me will serve to illustrate the form of the disease. The most constant *post-mortem* lesion, and the one which attracted my attention most, was the copious extravasation of blood, external to the spinal meninges; it was present in all the cases which died. This is not noticed by writers on the subject, nor does it appear to have been present in any of the cases occurring in Ireland, the marks spoken of as being continually present in this disease were only observed in one case, and were then not well-marked.

CASE 1.—J. A., an officer's servant, black, a native of Barbados, a well-made and apparently healthy young man, was on the 24th July, 1865, attacked by a mild form of fever, from which he had suffered on several previous occasions, and which had then been successfully treated with a purge and diaphoretic, followed by quinine in 5 gr. doses for a few days. On this occasion he was ordered a purge and the diaphoretic mixture. On the morning of the 25th he got up feeling much better, and walked about the gallery of his quarters in the shade. About 11 A.M. he went into his room, lay down upon his bed, and in about 10 minutes was found by one of his fellow servants insensible, lying on the floor. Being in the mess-room at the time, about 30 yards from his quarters, I saw him at once, and found him perfectly insensible, breathing natural, face pale, pulse small and hurried, regular, pupils contracted, hands clenched, head burning hot, skin dry, passing urine and fæces involuntarily. He died in three hours, without having recovered consciousness.

I made a *post-mortem* examination 24 hours after death, when I found the viscera of the abdomen and thorax healthy, with the exception of the spleen, which was enlarged. On removing the calvarium and brain from the skull, the blood flowed from the severed vessels in a fluid scarlet stream, and did not coagulate for some time after exposure to the air; the brain was to all appearance healthy, and the membranes natural; but on removing the brain from the base of the skull, a large quantity of serum escaped; and in dividing the medulla oblongata, the serum literally poured out from the spinal canal, carrying with it flakes of coagulated lymph. There was no fluid in the ventricles of the brain. The spinal column was next examined, and on removing the spinous processes of the vertebræ, the membranes were seen distended with fluid, even after the quantity which had escaped from the opening made by removing the brain; dark clots of blood, extravasated between the membranes and the bones, existed at detached points along the cud, and the membranes themselves were very vascular, especially posteriorly; even the minutest vessels being intensely infected with blood; flakes of coagulated lymph similar to those seen on removing the brain, were adhering to the cord in several places; the substance of the cord itself was natural.

CASE 2.—Private W. G., 2nd Battalion 3rd Regiment, was admitted into hospital with slight symptoms of fever. He was a sober, steady man, of good cha-

racter in the regiment, and of regular habits. It appears that he had for two days beforeadmission been ailing, but had no definite symptoms for which he could report himself sick. As soon as pain in the head and back came on he did so. He was given a saline purge and a purgative enema, followed by a warm bath; for two or three days he showed no bad symptoms, and the slight fever he had on admission subsided. On the morning of the fourth day he was found to be dull and heavy in his manner, evidently disliked being spoken to, but complained of no pain in the head, back, or legs; the urine was natural, and the pulse quiet and regular: there was an anxious expression about the face, and the tongue was slightly furred at the centre; the bowels had been moved during the previous 24 hours, but were costive. Ordered blue pill and colocynth, to be followed by a cathartic draught. During the day there was no change; the bowels had been moved at five P.M. Same day I was called to see him, and found him insensible, urine and fæces passing involuntarily, pulse 130, full and strong, pupils fixed, neither dilated nor contracted, skin perspiring profusely, especially the head and upper extremity; breathing laboured.

About 10 ounces of blood was at once taken from the back of the neck by cups, and a blister 12 inches long and 3 wide, saturated in blistering fluid, applied along the cervical vertebræ. At 12 P.M. he had not recovered consciousness, the pulse had fallen, there were involuntary twitchings of the facial muscles, and fluids put into the mouth in small quantities excited the act of swallowing. He continued in the same state till morning, but gradually recovering the power of swallowing. About six A.M. I gave him six ounces of champagne, and in about an hour after he had recovered sufficient consciousness to be able to nod assent with his head when spoken to. He died at 12 noon.

The *post-mortem* proved all the viscera of the thorax and abdomen to be healthy, the brain itself natural, but the veins and sinuses distended with blood; the spinal canal was full of clotted blood; in fact, the cord lay in one clot of blood from the foramen magnum to the canda equina; the membranes were congested, and on opening them the cord was found surrounded with bloody effusion.

Two Cases of Delirium Tremens. By Staff Assistant-Surgeon J. A. Shaw, M.D.

Case 1.—Serjeant W. N., 2nd Battalion 24th Regiment, a stout, healthy-looking man, has been acting as Canteen Serjeant for some time, was admitted this day into hospital at 2 P.M. He had evidently been drinking heavily, and must have been without proper sleep for at least a week, though his own account cannot be depended on. On admission he was in a high state of nervous excitement; hands and tongue very tremulous; the tongue being also coated with a white pasty fur; eyes slightly bloodshot; skin perspiring; pulse quick, and though apparently full was compressible; bowels confined. Ordered a purgative draught, tepid dashing over the head and shoulders, and a draught, immediately afterwards, of laudanum and henbane in camphor mixture, and to be kept very quiet and the ward darkened.

Vespere.—He had vomiting of dark bilious fluid, especially after taking food, which he was only able to take in a liquid form; was quite rational. During the night the horrors came on very badly; and he was rambling about, begging for something to drink, complaining of great thirst. Was immediately put to bed and well watched; an aromatic and morphia draught was given, and cold applied to his head. He was fed frequently during the night, as well as the previous day, with strong beef-tea.

May 15.—This morning he was in a dreadful state, quite unable to recognise anybody, and great excitement present, muttering about the canteen and his other duties, and was in a state of great terror; eyes wild; countenance anxious; his face, with the upper part of his chest and neck, being darkly congested; his skin bathed in perspiration; his head hot; pulse feeble and fluttering, so rapid it could not be counted; bowels still confined, and vomiting increased. Ordered a calomel and jalap purgative, followed by a hydrocyanic acid and chloroform draught, with creosote: this allayed the extreme vomiting.

At 1 P.M. I saw him again in the same state, and ordered him 2 ounces of brandy in a bottle of soda water immediately, and a draught of laudanum and stimulants.

To be given afterwards, strong beef-tea *ad libitum*, lemonade to drink, room kept dark, and cold continuously to his head.

Vespere.—At 5 P.M. I found him very restless and excitable; head hot; face and chest darkly congested; no sickness of stomach; pulse extremely rapid and feeble. Ordered a tepid douche, and a drachm of laudanum in a glass of beer afterwards; brandy and water in small quantities every hour, and beef-tea every half hour; hair cut close, and a blister for an hour to the nape of his neck; cold continued to the head.

At 10 P.M. saw him again; found he had slept uneasily for about an hour and a half, starting up occasionally in extreme terror, his hands moving rapidly. He was apparently better after the sleep, though still there was great nervous exhaustion present. Ordered a quarter of a grain of morphia, with henbane and a stimulant, every two hours if awake; on no account to be wakened. No urine was passed all day, and the bladder was found empty, none being secreted. His tongue was dry, coated with a dark-brown fur. I did not see him again alive. He continued without further sleep, and very restless, starting up and struggling, and falling back exhausted. At 3 A.M. on the 16th he became quiet, and at 3·30 A.M. his face changed, and before the Orderly could call the Hospital Serjeant he was dead.

Post-Mortem Appearances.– Surface of face and chest darkly congested.

Brain.—Sinuses of dura mater loaded with fluid blood; entire brain and membranes congested; the base of the brain and the spine filled with blood; the brain substance softened, and apparently fatty.

Lungs.—The entire of both lungs intensely congested with black fluid blood; the lungs filling the chest cavity completely, and bursting out from it when it was opened.

Heart.—Pericardium contained about 3 ounces of serum; the heart covered with an abnormal amount of fat on its surface, and the corinary veins congested to an extreme extent; heart's structure firm, the muscular fibres being apparently normal, and valves healthy.

Liver enormously enlarged, fatty, weighing 6 lbs., structure softened, breaking down under slight pressure of the finger, yellow and mottled from fatty degeneration. Gall-bladder distended with bile.

Spleen intensely congested, structure soft and pulpy.

Kidneys.—No urine secreted; bladder empty; kidneys loaded with fat, softened, and breaking down under pressure; left kidney very much congested and enlarged, weighing 10 ounces; right kidney in the same state, but less enlarged, weighing 8 ounces.

Remarks.—This case goes far to show that the heart's structure is not necessarily softened in delirium tremens, as though the other organs were all so very much altered abnormally, the muscular tissue of the heart was normal, ***not even softened***, though there was an increased deposit of fat on its surface.

The blood-poisoning from the alcohol was doubtless increased by the suppression of urine, which suppression may have been aggravated by the opiates, as also the congestion of head and lungs may have been increased from the same cause. The cold or tepid douche appears to act with unmixed benefit, if it does not produce too great a shock on the system. In this case the blister produced no benefit, as he was so restless it was impossible to keep it on. It was also with difficulty he could be got to take his nourishment. I believe now that this case ought to have been treated with more stimulants, and though nourishment was given frequently and in large quantities, that it ought to have been as *concentrated* and varied as possible, and containing stimulants; for although stimulants may increase the quantity of alcohol in the blood, still there is great immediate danger from nervous exhaustion, which in severe cases I do not believe can be warded off by non-stimulating nourishment.

CASE 2.—Corporal J. S., 2nd Battalion 19th Regiment, 35 years of age, and of nine years's service. An old drunkard, with six admissions for ebriositas, being brought up to hospital as a prisoner on the 12th, was admitted for ebriositas.

May 16.—Disease changed to-day to delirium tremens. He has not slept at all since the night of the 13th, in spite of anodynes and other treatment, and for some days before had only a broken sleep at night, with intermissions. This morning he was found very excitable, picking at the bedclothes, fancying insects over the bed, and complaining of being annoyed by boys, &c. His head was hot; pulse quick,—130 per minute,—soft, but with a thrill to the touch; tongue foul; bowels constipated; urine scantily secreted. Ordered a cold douche bath, a drop of croton oil on the tongue, a calomel purgative, and immediately after being put to bed, half a drachm of laudanum, with some henbane, and a stimulant in a glass of beer immediately; the ward darkened, and to be watched constantly, and kept as quiet as possible; nourishment frequently (he has, since his admission, had frequent nourishment given.)

May 17.—This morning, as he had derived no benefit from the opium, and the pulse was still 130, he was ordered two drachms of tincture of digitalis in a draught, egg-flip with brandy every hour, ten minims of chloric ether in each dose; strong beef-tea at intermediate half-hours with the egg-flip, with ten minims of laudanum in each dose. Had him removed to a darkened, isolated ward, from which patients had to be removed.

1 P.M.—Arterial circulation lessened by the digitalis. Pulse reduced from 130 to 80. No urine passed since the day before. Gave him a turpentine stupe over kidneys, which relieved him. Head still hot, and nervous excitement continues. Ordered head to be shaved, and ice applied continuously. After a cold douche, to have a blister on the back of his neck.

5 P.M.—No better. Pulse quickening again. During the day and previous night has taken 6 eggs, 3 pints strong beef-tea, 2 oz. of brandy in egg-flip, 1 pint ale. Tepid douche repeated. A drachm of tincture of digitalis, and same of henbane, in a glass of beer afterwards.

May 18.—Was seen by me three times during the night. He passed a dreadful night, requiring two men, constantly watching him, to hold him in bed.

4 A.M.—Had a cold douche, and a strong sedative draught; strong beef-tea and egg-flip every half-hour; ice in a bladder to the head continuously. A handkerchief was put over his eyes to blindfold him, but he tore it off immediately.

9 A.M.—Was much worse. Imagined he was being forced into a cart to be taken away to be hung. Skin covered with perspiration; bowels constipated; no urine secreted; head still hot; pulse so rapid it cannot be counted. Nourishment every half hour. Turpentine stupes over the kidneys. Two drachms of sweet spirits of nitre in a dose.

11·30 A.M.—Had a draught containing a grain and a half of morphia.

1 P.M.—Injected hypodermically 20 minims of liquor of morphia,—equal to half a grain of morphia,—beneath the skin of the left arm, with no effect.

2·30 P.M.—Injected 30 minims more of the solution, and at the same time blindfolded him. *While I was injecting it under the skin of the arm, he got drowsy and fell asleep.* He had a disturbed sleep for about two hours, when he woke up much quieter and more rational, though still tremulous and shaky. He was given nourishment, and after a time he went to sleep again, and slept throughout the whole night, having been four nights without any sleep whatever.

May 19.—This morning he felt a different man. The pulse was very weak, and he felt drowsy and confused, but had no distinct headache, and is perfectly rational. He complained of a feeling as if he was beaten all over. All medicine stopped. Beef-tea, eggs, and milk continued. All stimulants gradually stopped. Given a purgative.

May 23.—Is now quite well, and able for his duty, but kept in hospital for a time to try and break off his taste for liquor.

June 3.—Discharged to duty. He informs me that since his illness he has become a teetotaler.

Remarks.—The brandy, eggs, beef-tea, and milk, did great good, and I believe that all were absolutely necessary. The anodynes, though they did not produce sleep, no doubt lessened nervous irritation, although it still was so severe.

The digitalis acted wonderfully well in lessening the pulse, as it made it slower and more regular, without the pulsations becoming weaker, but rather the contrary.

The injection hypodermically of morphia could not have acted better, its beneficial results having commenced immediately ; and though its effect may have been increased by the gr. jss. dose of morphia before, yet the dose had no effect for three hours ; but on injecting beneath the skin, he got drowsy in a *few seconds.*

I believe that delirium tremens is best treated with stimulants and narcotics, and full doses of digitalis to quiet the pulse ; strong nourishment,—as egg-flip, very strong beef-tea, milk, &c.,—being given very frequently. Cold or tepid douches, the room darkened (or the patient blindfolded if it does not make him struggle), cold to the head, the hypodermic injection of morphia, and absolute quiet enforced. Stimulants, of course, must be given very cautiously, so as not to exceed, if possible, what is required to prevent exhaustion.

Complications,—as suppression of urine, vomiting, or constipation,—being met as they arise.

I believe digitalis to be a safe remedy in uncomplicated delirium tremens, as I do not consider the heart's structure to be softened or organically altered as a necessary part of the disease, but that it is in an irritable state from the poisoned blood.

I would have no hesitation in giving as much as two drachms at one dose, in an extreme case, to a strong and otherwise healthy man.

Case of Sudden Death from "Myocarditis." From the Annual Report of the 4th Brigade R.A., Toronto. By Surgeon Hanbury, M.B.

This is an instance of a rare disease, and is worthy of notice as in some way illustrating its pathological anatomy. The subject of it, a gunner in H Battery, was found dead in his bed on Chrismas morning at half-past three o'clock. He was lying with his face towards the pillow. He was a strong muscular man of 41 years' of age, and 19 years' service, of good character and temperate habits. He does not seem to have been the subject of syphilis at any time, and there are only three entries in his medical history sheet for trivial ailments. The Serjeant-Major of his battery, whose bâtman he was, reported that he had heard him complain occasionally of pain and palpitation of the heart for a short time previous to his death, and that on this account he had to give up smoking. On the night of the 24th December, when in bed, about eleven o'clock, he complained to one of the men of pain and severe palpitation of the heart, and in a few hours afterwards he was found as described.

At the autopsy, which was held 36 hours after death, the rigor mortis was was well marked ; no signs of constitutional syphilis could be observed. The brain and its membranes were healthy. The lungs were deeply congested, giving out, on incision, a copious serous fluid. The pericardium was healthy. The heart internally was quite healthy, if anything slightly larger than natural. The anterior wall of the left ventricle presented an extraordinary mottled and echymosed appearance, suggestive of the idea that it had sustained a severe bruise. In this situation there was some thickening of the serous lining, and isolated blotches of a pale fawn colour, resembling soft cartilage. On laying open the cavities both auricles were found distended with dark coagulated blood, the right ventricle partially so. The left ventricle was found almost empty, but the anterior wall at its lower third presented the same bruised and echymosed appearance throughout its structure, but especially marked about the apex. Three small patches of fawn-coloured deposit were observed, and a sacculated clot of dark blood about the size of a large pea in the substance of the muscle.

The part involved presented a dark, almost livid appearance, and in consistence was soft and friable. That part of the organ beyond the seat of

the disease was softer and paler than natural. The endocardium stretching from the mitral orifice to the apex was pale, opaque, and studded with fawn-coloured deposit. One of the papillary muscles was greatly hypertrophied, and on incision was found to be composed of the same yellow semi-cartilaginous deposit already noticed. The valves and arteries were healthy, as were the abdominal organs.

I regard this case as very interesting, both from its rarity and the pathological lesions revealed, as well as the connection between these lesions and the fatal result. I believe the original disease was endocarditis, from the amount of disorganization found in one of the papillary muscles, that the muscular structure became subsequently involved, producing that sero-sanguinolent infiltration and pulpy condition of the muscular fibre described by Stokes, Walshe, and Hasse. I am not aware of any case on record of sudden death from endo-myocarditis without rupture, and can only account for it in the present case on the same grounds as Mr. Paget explains the pathology in cases of sudden death from fatty degeneration, that the muscle no longer retains its proper power. Mr. Paget remarks, "The principal "character which all these cases seem to present is that they who labour "under this disease (fatty degeneration) are fit for all the ordinary events "of calm and quiet life, but are wholly unable to resist the storm of a "sickness, an accident, or an operation."

The excitement and doubtless indulgence to an unusual extent in drink on this particular afternoon induced that rapid action of the heart which resulted in sudden and fatal failure of this organ to perform its proper functions; and it is really difficult to comprehend how a disease of this description could have existed while the subject of it did not even consider himself ill enough to seek admission into hospital.

Cases of Erysipelas, with Remarks by Assistant-Surgeon Boileau, M.B., 29th Regiment, Canada.

DURING the month of November 1867, in the healthy station of Hamilton, Ontario, I had under my treatment nine cases of erysipelas, the majority of which belonged to the category of the true disease, described as such by Sir Thomas Watson, the remainder being diffused inflammation of the skin, and of the sub-cutaneous tissues of the lower extremities.

Amongst these nine cases we had the following forms:—

Erysipelas followed by desquamation, followed by vesicles and bullæ, and followed by suppuration. These three forms attacked the face, and head and neck. In the lower extremities we saw true and unmistakeable angiolencitis, terminating in resolution; the common cutaneous form followed by desquamation; and lastly, the cellulo-cutaneous form, terminating in peoriform degeneration, and vast sloughing of subcutaneous tissues, with scarcely any destruction of the skin.

For all these varieties there was a common cause. They came from the same building, and although a few of the patients were men that belonged to companies inhabiting an isolated and elevated building about a mile distant, yet these men occupied all their working time in the building where the cause of the disease existed; and this was unquestionably to be found in the defective hygienic arrangements of the old store occupied by the men.

That all the cases occurred in such rapid succession, and came from the same building, is, I think, a strong proof that although the disease attacked in various forms different parts of the body, it was in all the same specific disease, and I am justified, I believe, in grouping together those in which the head and face and neck only were attacked, and those in which the disease was limited superiorily by the region of Poupart's ligament.

By bringing forward these cases I desire especially to add my testimony to the efficacy of that indispensable medicine in this disease, *Iron*, notwithstanding the sceptical ideas on this subject held by so many; further, I think they show that true erysipelas is a disease which may attack the lower extremities as well as the head and face, and lastly they are of value in proving that an efficient cause of erysipelas may be produced by the violation of hygienic laws.

I administered to each patient 30 drops of the tincture of the sesquichloride

of iron every fourth hour, as a rule, reducing the quantity as the patient improved, but giving ten drops three times daily, until health was established; my observations would lead me to state that it is most necessary to continue the medicine until all symptoms have subsided; for in one case there was clearly traceable a connection between the severity of the signs and the quantity of iron taken daily.

In combination with the tincture, I used a lotion made by adding to one pint of boiling water one drachm of ferri sulphas; folds of lint were saturated in this, and applied under oiled silk to the affected parts.

The patients were allowed a liberal diet, with ale, and sometimes port wine. All recovered well and rapidly, excepting one man, whose case I will now give.

Private *J. G.*; aged 25 years; service, 7; a stout, able-bodied young man, presented himself on the second day of the disease, which originated in an ulcer of the leg, the result of an injury. He subsequently suffered in succession from precordial pains, palpitation, dyspnœa, frontal headache, insomnia, epistaxis, great thirst, great tenderness of the affected limb, very white tongue, burning pains in the leg, diarrhœa and pneumonia: he was, in fact, a very great sufferer for about a fortnight, and required the most careful nursing and watchfulness on our part and that of his kind comrade attendants.

The iron treatment was commenced on the morning of the fourth day of the disease. On the 10th he was taking only 10 drops three times a day, as the disease had been quite arrested; at the same time, there was no doubt that the result of the disease as early as the fifth day was the utter destruction of an immense area of the tissues under the skin, necessitating the free use of the knife; three large incisions, a probe's length from each other, were made in the leg, and two in the thigh. He remained in hospital many days, sloughs discharging in large quantities through the openings, and being daily extracted with forceps.

He was rapidly improving until the 33rd day after admission, when an erysipelatous case was admitted, which was unavoidably placed in the ward. On the next day an intensely red blush covered the convalescent's leg, his temperature went up, and the healing wounds looked angry; but at once the of the tincture of iron every second hour was had recourse to, and by the following evening his temperature was normal, the wounds were healing, the danger was passed, and he rapidly got well.

In this case there is well illustrated the rapidity of the destructive process. I am fully convinced that the height of the disease was reached on the day the iron was commenced, and that it was the specific inflammation of the second, third, and fourth days that resulted in the destruction of almost one-fourth of the subcutaneous areolar tissue of the leg and thigh.

The iron treatment is directed not to efface nor mitigate the results or effects of the disease, but to the limitation and arrest of the disease itself. The action of the drug is inexplicable, but I think the profession may claim for this medicine in erysipelas a power almost equal to that of quinine in periodic fevers.

Case of Thoracic Aneurism, in which the Patient lived for fifteen days after its Rupture. By Assistant-Surgeon Boileau, M.B., 29th Regiment.

An old soldier of the 29th Regiment complained of a pain in his chest, of about six days' duration, and a slight difficulty of breathing.

During the service of many years at home and abroad he had enjoyed excellent health, had not had venereal nor rheumatism, and had performed his duties to the day he reported himself sick.

We found great feebleness of respiration, and remarked a slight fulness of the left upper extremity veins. He was admitted to hospital, and was discharged in 13 days, apparently—and expressing himself—much better. No satisfactory diagnosis was made.

He performed his duties for five days and "came sick" again, and now the phenomena were the following:—

Intense dyspnœa, suggestive of asthma or laryngeal disease. Great stridor

from below. Resonance of the whole thorax. Inspiration and expiration, accompanied by a loud purring sound. No vesicular breathing. He became rapidly worse, and in the afternoon he was found in a state of collapse, quite insensible, the whole body cold and clammy, the perspiration pouring from his pallid face, the eyelids half closed over the upturned eyeballs, the teeth clenched, the superficial arteries pulseless; the only evidence of life was an occasional stertorous gasp for breath.

By the diligent and persistent use of restoratives for upwards of two hours, he was restored to life. We left him in the sitting posture well and warmly supported, still gasping, but expressing himself better by signs. He was given 3 grains of extract of conium and 40 drops of tincture of opium. At ten o'clock that night he was very much better, able to articulate monosyllables, the skin warm, and distress generally mitigated. He appeared to have been sleeping, but we gave him 30 drops more of the tincture of opium.

Next morning there was a decided amendment. Respirations had fallen from 40 to 20, and although he suffered from orthopnœa, there was no extraordinary action of the voluntary muscles of respiration.

Pulse in temporals and right radial, 132, compressible, unequal, and irregular; no pulse in left fore-arm, that in the brachial much feebler than that in the right. No difference in the pulsation of the carotids; no difference in the appearance of the pupils, no difference in the temperature of the axillæ; left upper extremity veins turgescent; skin warm. Whole thorax very resonant; no localized dulness. The stethoscope revealed the same loud purring sounds, not râles, like the lower note of a base fiddle. Over the trachea and larger bronchi the respirations were very "brazen." In consequence of this, the cardiac sounds were scarcely to be analysed, but there was a peculiarity in the rhythm, a succession of sounds which on many days was heard the same,—viz., two hard sharp sounds, followed by four soft and muffled, without any murmur. He expectorated in considerable quantities a glutinous sputa, but no blood. He had never had hæmoptysis.

On the following day he had a return of the urgent dyspnœa and syncopal fit, from which he was restored by the same means as before.

The expectoration continued, but without a trace of blood until the fourth day after the first fit, when a very small quantity appeared, after which it was always present in the sputa, and in increasing quantities.

The cardiac sounds were very distinctly heard under the upper sternal region, and here also a distinct but very feeble impulse was appreciated when conveyed by the stethoscope to the ear, not detected by the fingers. The breathing sounds became painfully loud and blowing, if not cavernous, no gurgling, even on coughing or forced inspiration.

He daily improved in many respects, the distress became less and less; he spoke better and better; he slept moderately well at night; he laughed now and then; often looked quite cheerful, and was indeed very sanguine of recovery; but the blood in the sputa increased steadily more and more until the 20th day after the first fit, when in a paroxysm of coughing he expectorated a large quantity of pure blood, and immediately expired.

Autopsy.—Complete ossification of the sterno-clavicular articulation and cartilages of the 1st ribs. Osseous transformation of the thyroid cartilage; the rings of the trachea much harder than usual, a rigid condition particularly expressed in the bronchi from the first to about the sixth divisions; all the terminal bronchi much dilated; the cellular structure of the lungs apparently normal except at the base of the left, where there was a slight pneumonic consolidation. Bronchial glands considerably enlarged, indurated and darkened.

The orifice of the left subclavian almost obliterated by an atheromatous deposit.

Ascending aorta much dilated, measuring 5 inches from valves to origin of innominata, and 6¼ inches in circumference, its whole internal surface a mass of atheromatous degeneration. From its posterior inferior aspect a sacculated aneurism projected backwards towards the bifurcation of the trachea. It was half filled with very tough laminated fibrine and recent clots; the communication between this sac and the aorta was a circular well-defined aperture about the size of a shilling, and was situated about half an inch above the valves.

The immediate cause of death was the outpouring of blood from this sac into the right bronchus through a ragged opening, which had evidently increased to nearly the size of a threepenny piece by a process of ulcerative absorption. Into this opening there projected a thinned denuded ring of the bronchus.

Remarks.—The patient lived fifteen days after the rupture of the aneurism.

It is safe to assume that the maintenance of life was due to the large amount of opium which he took,—half an ounce of the tincture daily after the first syncopal fit. Not the slightest symptom of narcotism was produced. This perhaps was altogether due to the exhalation of belladonna extract two grains daily.

The restorative treatment mainly consisted in the application of large mustard sinapisms to the back and chest, placing his legs up to the knees in hot water ; and in the forcible administration of brandy by the mouth, the clenched teeth being forced open, and reflex action of the pharyngeal muscles induced by the finger.

The absence of the left radial pulse was not due to pressure, but to atheromatous disease at the origin of the subclavian, so that although this absence was considered an important element in the diagnosis of aneurism, it had nothing whatever to do with it, but was an independent symptom, just as much so as the peculiarity of the breathing sounds which was due to the rigid condition of the air tubes, the result of osseous degeneration, and not to any pressure on the trachea or bronchi, which were quite patent. Indeed, the physical signs of aneurism were scarcely present ; the local throbbing was so slight that some denied its presence, the dysphagia was elicited only by leading questions.

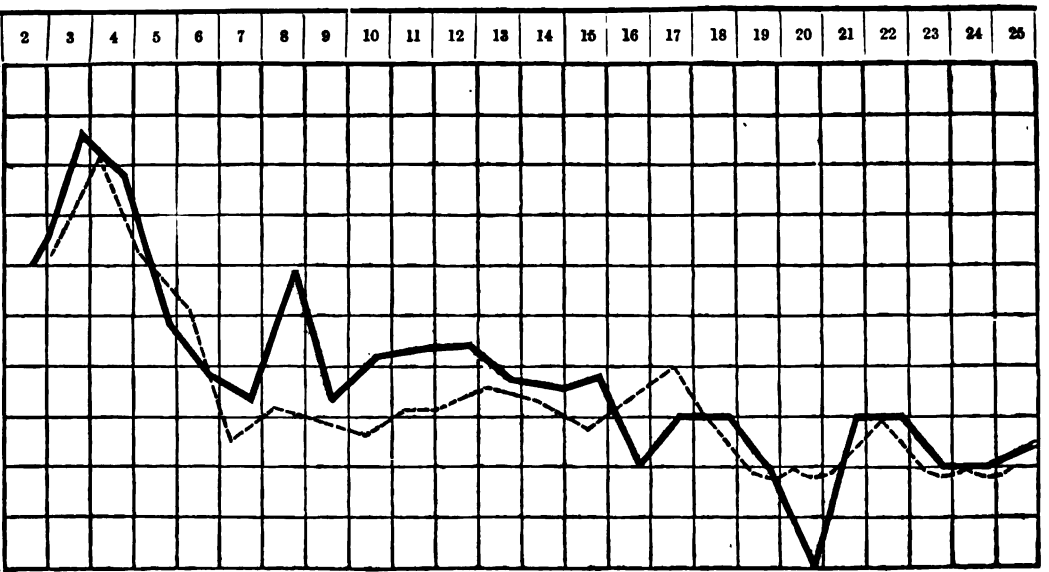
But the three practical lessons illustrated by this case are these—

We should not despair of prolonging life, even after the rupture of an aneurism.

We should investigate closely all cases in which a soldier complains of thoracic discomfort.

The peculiarities of the pulmonary sounds, and of the vascular actions may in a case of aneurism be due to causes independent of that disease.

Case of Cellulo-Cutaneous Erysipelas of the leg and thigh in a man aged 25—service 7 years—followed by a mild but prolonged attack of Pneumonia of the left lung, which was detected by local pain and a crepitus on the 8th day.



N.B.—It is exceedingly probable that if the patient's temperature had been taken about noon on the 4th day, that the greatest erysipelas temperature of the case would have been ascertained, as the morning temperature was only 0·4 below the previous evening, and 2·2 above the previous morning.

Day of Disease		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Temperature.	Morn.	—	102·4	104·2	102·4	101	98·6	99·2	98·8	99.6	99·2	99·2	99·6	99·4	—	—	100	99	98	98	98	99	98	98	98
	Even.	102	104·6	103·8	100·8	99·8	99·4	101·8	99·4	100·2	100·4	100·4	99·8	99·6	99·8	98	99	99	98	98	99	99	98	98	98·4
Pulse.	Morn.	—	118	120	108	100	100	92	92	88	80	92	88	98	100	98	108	100	—	96	96	—	—	—	—
	Even.	122	124	138	108	104	—	116	112	98	92	96	96	88	96	104	92	—	96	—	96	—	—	—	—
Respiration.	Morn.	—	32	24	28	32	20	24	28	24	—	24	—	—	—	30	24	20	—	—	—	—	—	—	—
	Even.	—	27	28	—	30	—	32	34	—	32	28	26	24	20	24	20	—	—	—	—	—	—	—	—

APPENDIX No. IX.

REMARKS ON PNEUMONIA.

(By Assistant-Surgeon WELCH, 22nd Regiment.)

A REFERENCE to the Statistical Returns of the 1st Battalion 22nd Regiment for the year 1867 demonstrates that 20 per cent. of the entire admissions were caused by pneumonia, and that during the period of prevalence of the disease, viz., the winter and early spring months of 1866-7, this percentage was augmented to 46 ; the actual number of attacks for the entire year being 52, with two deaths. The occurrence of so many cases of a severe affection during the first winter residence in a North American climate of a battalion, after completing six years in the Mediterranean, deserves a more than ordinary attention, especially since the opportunity of studying the idiopathic form of the malady on so large a scale, in so circumscribed a period, but rarely occurs. The following is a *résumé* of the chief symptoms observed characterising the disease, and deductions therefrom in reference to its nature, etiology, pathology, and treatment.

Premonitory Symptoms.—Anterior to that period of the affection, when diagnosis as to its nature was no longer questionable, the greater number of the cases was characterised, during a space of time varying from six to two days, by a general systemic derangement, manifested by want of appetite, dryness and harshness of skin, congestion of mucous membranes generally, listless expression of eye, disinclination for bodily exercise, drowsiness, chilliness, torpidity of intestinal canal, headache, and wandering rheumatic pains, succeeded by a well-defined accession of high febrile disturbance, and symptoms objective and subjective of inflammation of lung tissue. In some few, however, the duration of this prior stage was so short, that the cough, dyspnœa, and expectoration, were considered by the patient to be the first interruption from perfect bodily health and activity. In these the exciting cause was clearly and unhesitatingly stated by the sufferer, and often dated to the hour ; the intensity of the symptoms due to the local lesion excluding from personal recognition the short preceding ones of systemic derangement ; in those, although the combined onset of sympathetic fever and lung involvement was clearly marked, yet the previous *malaise* could not be accurately defined as to its commencement, nor the ascribed cause precised as to its period of operation, but merely in general terms ; however, the impression conveyed to the mind of the observer, and borne out by careful enquiry, was, that in all the phases through which the system passed from the first aberration from normal state to development of the local lesion were uniform, the duration of the period embraced being in an inverse proportion to the immediate effects brought about by the exciting cause, and consequently dependent on its intensity of action.

Before, however, entering upon a detailed account of the symptoms associated with the local lesion, their individual variations, and possible modifications by treatment, it seems better to illustrate the natural history of the disease by citing one of the cases, uninfluenced by therapeutic measures, as a basis for subsequent remarks.

Case.—Private Shannon, a healthy growing lad, aged 17 years, no predisposition, bodily chilled by lying on mattrass stuffed with straw, mingled with snow. The day following, complains of chilliness, shivering, dryness of skin, disinclination to exercise, anorexia, drowsiness, catarrh, with torpor of bowels.

During the evening, bilious vomiting ensues, with duskiness of face and lips; is seized, while asleep, with cough, dyspnœa, pain in chest, expectoration, &c., associated with shivering, pungency of skin, and general fever. Second day: On admission into hospital, the lower two-thirds of right lung are in a state of engorgement, as evinced by dullness on percussion, diminished expansion, vocal fremitus, bronchophony, and minute crepitation; constitutional disturbance great, drowsiness and headache, dull, listless eye, duskiness of countenance and mucous membranes, rheumatic pains over body, harsh pungent skin, constipation, parched mouth and dry foul tongue, great thirst, no appetite, inability to sleep; pulse 108, full, throbbing; respiration shallow, 38 per minute; epigastric temperature, 100°; breath, 88°; urine, ℥xxvij. in 24 hours; specific gravity, 1,018, dark-coloured, intensely acid; trace of urea, increased uric acid, urates and phosphates containing much mucus and trace of chlorides; expectoration slight, rusty-coloured, with no mingling of bronchial secretion. Third day: No rest at night, increased dullness and vocal fremitus over the lower part of the right lung, and diminished expansion, bronchial respiration, and bronchophony marked; no crepitation, except on forced inflation of lung tissue, the vesicles admitting much less air than yesterday; subsidence of bilious vomiting, continuance of other symptoms; urine same in quality, quantity ℥xxx. in 24 hours; pulse, 92; respiration, 30 per minute; breath, 89°; epigastric, 101°. Fourth day: Complete consolidation of inflamed lung tissue, abatement of febrile disturbance, skin 99°, perspiration great and intensely acid, much diminution of drowsiness, dyspnœa, and duskiness of lips; pulse, 84, normal in tone; respiration, 28; dryness of mouth, thirst, anorexia, and constipation continue; urine without mucus, depositing much urates, urea and chlorides increasing, amount ℥xxiij. in 24 hours; no expectoration. Fifth day: No change beyond return of healthy rest at night and restoration of secretion of mouth and intestinal tract. Sixth day: Returning crepitation over lung, expectoration small in quantity, the rusty colour obscured by slight opacity, skin soft and normal, increased appetite and regularity of bowels, duskiness of lips entirely gone, urine lighter-coloured, less acid, urea normal in quantity, slight increase of uric acid and urates, copious deposition on testing for chlorides, quantity ℥xxiij. Seventh day: Disinclination to remain in bed, no expectoration nor cough, great weakness, pallidity of countenance, and general anæmia. Tenth day: Lung completely cleared up, only abnormal stethoscopic sign being a prolongation of expiratory murmur from deficient resiliency of fibrous tissue of air vesicles; slight dyspnœa on exertion, functions of body natural, asthenia and pallor of countenance. Discharged.

The nutriment administered consisted of beef tea and lemonade up to hepatization of lung, and subsequently full diet and porter.

Thus the indications of the morbid process from the symptoms in their order of occurrence may be summed up as follows:—

(*a*) Premonitory symptoms of arrested secretion of skin and mucous membranes, and consequent retention in body of effete products.

(*b*) Congestion of internal organs, especially of lungs, liver, and kidneys, associated general indications of same and rheumatic pains.

(*c*) Inflammation of lung tissue, with pungent heat of skin and sympathetic febrile disturbance.

(*d*) Gradual consolidation of lung tissue, with accompanying diminution of fever and restoration of secretions of skin and kidneys.

(*e*) Return to normal state of intestinal canal, and removal by absorption or expectoration of morbid products in the air vesicles.

(*f*) Renewed patency of air vesicles, with deficient resiliency in the affected portion of lung; restoration from asthenia and anæmia to ordinary health.

This, then, may be considered as exemplifying the course of lobar pneumonia tending to recovery, and the symptoms enumerated were modified in no marked degree by the medicinal treatment employed in the majority of the other cases. The coincidence of onset of the high febrile disturbance, pungency of skin, and lung involvement, was clearly defined in all; but intermediate between the premonitory symptoms and the local involvement was the bilious vomiting, which characterised 27 out of 41 clearly ascertained cases, or in the ratio of 65 per cent., an consisted of watery acid fluid, tinged to a

varying extent with biliary products. Its frequency of occurrence in connection with the degree and site of the lung lesion is thus shown.

In 16 cases where the right lung was involved, present in 12, ratio 75 per cent.; in 10 cases where the left lung was involved, present in 6, ratio 60 per cent.; in 15 cases where both lungs were involved, present 9, ratio 60 per cent.

Single lung involvement: In 21 cases, one lobe only affected, present in 16, ratio 76 per cent.; in 3 cases, two lobes affected, present in 1, ratio 33 per cent; in 2 cases, whole organ affected, present in 1, ratio 50 per per cent.

Double pneumonia: In 13 cases, one lobe each lung affected, present in 8, ratio 61 per cent.; in 2 cases, more than one lobe affected, present in 1, ratio 50 per cent.

Thus, then, it is clear that the presence of this symptom was in no way commensurate with the extent of tissue implicated, but the table would *primâ facie* appear to lend support to the inference of a relation between its frequency and the involvement of the right lung, as though dependent on sympathy with contiguous diseased action; yet it is impossible to associate this derangement of the chylo-poietic viscera with either the degree or site of the local lesion, inasmuch as when present, it invariably accompanied the early stage only, and passed off as engorgement of the lung declared itself; it rather followed the degree of the general sympathetic derangement, and indicated a congestion of the liver and stomach, in which also all the other organs appeared to participate.

Other symptoms appearing early in the disease, and demanding especial notice, were the dusky hue of face and mucous membranes, drowsiness, and general depression, inasmuch as they strongly support the inference of a primary deteriorated state of the blood preceding the local lesion, anticipating, as they did, the latter; and diminishing, as exclusion of air from the vesicles by the presence of morbid products, was brought about.

The first stage of the local involvement, viz., the period from the first symptoms of congestion to full hepatization of lung tissue, and which averaged in duration 3·4 days, was essentially the one distinguished by activity of morbid action. It may be stated that the subsequent amount of lung involvement was in unison with the severity of the symptoms above-mentioned as expressive of a primary vitiated state of blood. The site and extent of the local lesion is indicated in the following Table:—

52 Cases.	Extent of Involvement of Single Lung.		
		Right Lung.	Left Lung.
Right lung 21	Lower lobe ..	19	13
Left „ 16	⅔ of organ ..	1	2
Both lungs 15	Whole organ..	1	1

Of the cases of double pneumonia, in 13 it was limited to the lower lobes, and in 2 (both fatal) the whole of the right lung was involved, and upper and middle lobes of the left. Associated with engorgement of the lung tissue were these general and local symptoms—thirst, dryness of the mouth and throat, foulness of the tongue, anorexia, and constipation, indicating arrested secretion throughout the whole intestinal tract, were always present, and the last to be relieved. The respiration and pulse bore no relation to each other, the abnormal increase in frequency of the former followed in uncomplicated cases the extent of inflamed lung, and diminished as consolidation advanced, in one case, to the amount of 8 per minute; but the complications of pleurisy, by restraining voluntary expansion of chest, and bronchial involvement, greatly enhanced the dyspnœa, which in simple lobar pneumonia was of but slight importance. In the majority of the cases noted, the temperature of the breath when only one lobe was affected was on the average reduced to 86°, and in one of double pneumonia to 80°; the prevention of exposure of the air inspired in the inflamed portion to the full influence of the blood, from the gradual accu-

mulation of morbid products in the vesicles, and the short duration of the air in the lungs, from abnormal frequency of respiration, may possibly account for this; the minimum was gradually reached at consolidation, the temperature rising to the normal standard as the air inspired entered merely the healthy vesicles, and the equilibrium of respiration was restored. Dryness, harshness, and augmented heat of skin, were components of the sympathetic fever, but in no case did the thermometer mark more than 103° at the epigastrum or in the mouth.

This morbid state of the cutaneous surface was immediately alleviated by the occurrence of perspiration, which generally was re-established early, was intensely acid and extreme in quantity, and productive of great relief, the mercury fluctuating from 103° to 98°, according to the persistency or not of the secretion. Restlessness and inability to sleep, with listless expression of the eyes, and nervous exhaustion, were marked symptoms. Where no bronchitic complication existed, the cough was merely urgent on the onset of the case, its maximum, as well as that of the expectoration, was obtained on involvement of the bronchial tubes; the minimum where the disease was limited to the air vesicles; in a few cases both might have been said to be absent. Bronchitic complication was present to the extent of 54 per cent., pleurisy 59 per cent. In nine cases delirium occurred, in the proportion of 20 per cent. of double pneumonia, and 21 per cent. of the single lung implication; it was of a low character, much resembling that of delirium tremens, and dependent on nervous exhaustion and want of natural rest; it was relieved by alcoholic stimulants and narcotics. The pain complained of was often very slight, merely a feeling of rawness in the chest; when severe, was of lancinating character, and dependent on the associated pleurisy; occasionally this symptom was entirely absent.

Of the stethoscopic signs of this stage, the first departure from the normal state to be noted was the crackling sound at the end of deep inspiration, associated with slight dullness, vocal fremitus, bronchophony, and diminished expansion over the affected portion; as the engorgement advanced, the crackling became more distinct, and accompanied each respiration, with intensification of the other signs and forced inspiration, until, when passing on into consolidation, it was not to be heard in ordinary pneumonic respirations, but only on inspiring deeply; the auscultatory symptoms being those produced by increased density of lung, and the separation by the decreasing inspired air of the thickened walls and contracting areas of the air vesicles from gradual accumulation of morbid products, associated with the ordinary signs of the complication as might be.

The main features of this, the most important stage of the disease, were the intensity of indications of blood impurity, and the extent of the secondary local lesion; the more important suggestions for treatment being to relieve the dyspnœa, especially when augmented by pleurisy, to restore the natural secretions of body, and to support the vital force.

The second stage of the disease, *i.e.*, hepatization of the inflamed lung tissue, supervened in 33 out of the 37 cases of single, and in 10 of double pneumonia; in four other of the latter, one lung only was consolidated, the other not passing beyond engorgement, and in one the disease was limited to this stage on both sides. Of the cases terminating in resolution without hepatization, the general premonitory symptoms, and those indicative of contaminated blood, were slight, the ratio between these and the extent of local lesion not being preserved. Restored patency of the inflamed air vesicles, by removal by expectoration and absorption of the morbid contents from their partially contracted areas, was quickly brought about, while in the other cases, on the completion of hepatization, a marked alleviation of the general symptoms, as well as those dependent on inflamed local action, ensued, the tendency towards reinstation of the healthy state progressing with consolidation, as though by the production of the abnormal material in the air vesicles the system was relieved of some offending substance. With the occurrence of hepatization all diseased action appeared exhausted, and, provided no further involvement of tissue followed (the probability of which depended apparently on the incomplete restoration of the excretory functions), nor persistency of bronchial complication, the natural powers were all centred in the removal of the effete pro-

ducts from the air vesicles. The symptoms peculiar to this stage were those expressive of quiescent consolidated lung, among which may be mentioned a remarkable reverberation of the voice of the auscultator over the hepatized portion during the application of the stethoscope. Dyspnœa, in proportion to the non-respiratory tissue, and more especially to extent of any accompanying persistent bronchitis, was present, with a tardiness in reinstation of the secretions of the intestinal tract; but the main feature of this stage was the asthema requiring constant nutritive support. The *crepitans redux* supervened after an average of two days of consolidation, the signs of solidification gradually diminishing on advancing disintegration and absorption, or expectoration of the vesicular contents to complete restoration of healthy lung-sounds with the exception of prolonged expirating murmur. One case only showed a tendency to permanency of the hepatized tissue; the subject, a man of very delicate constitution. The average period occupied between the occurrence of consolidation and the restoration of normal respiration was nine days, with an average duration of case from first symptoms of disease to recovery of 17·2 days, the extremes being 8 and 56. Anæmia and asthenia marked the convalescence. There was no tendency to relapse.

Of the changes ensuing in the blood, urine, and sputum, the following summary is explanatory:—

Blood.—As before stated, a morbid condition of this fluid suggestive of contamination by effete products of system, and indicated by duskiness of countenance and mucous membranes, drowsiness, weariness, and malaise, was present before pulmonary involvement. It was noted that when blood was drawn from the patient (by means of cupping glasses for relief of pleuritic complication) at commencement of engorgement of lung, it showed a slight increase in fibrine, general darkness of hue, and tardiness in arterialization, on atmospheric exposure; under the microscope the red corpuscles assumed a great tendency to adhere in rouleaux, and were met with in two conditions; in one of a brownish red colour, with no distinction of shade between the centre and circumference, and not varying on exposure to air; in the other, the more frequent, with normal characters, the white corpuscles were increased in number, the fibrine granular, and a more than ordinary amount of free granules. Later on in this stage the blood was thick, of a venous colour, and coagulated immediately on exposure, while if drawn where consolidation was ensuing, it was extracted from the vessels with great difficulty, and only after the repeated application of warmth and cupping glasses, fibrillating in the latter even before exposure to air, forming, on removing them, a firm, jelly-like mould adherent to the skin, and gradually covering itself with a crimson tinge; the alkaline reaction strongly marked. In one case, after hepatization had ensued, and while fresh involvement of tissue was taking place, in which blood was drawn in endeavouring to relieve the intense dyspnœa and congestion, the amount of fibrine was not so great as in that taken from the same man when consolidation was advancing. In single pneumonia, the coagulation of the blood was in no wise so great as in double pneumonia at corresponding periods of the disease. The abnormal condition of some of the red corpuscles, and the increase of the white early in the malady, were unquestionable; the amount of fibrine appeared to follow in ratio the extent of lung implicated and the progress towards consolidation. The chlorides were less than in health. In the worst case, the solid portion of the blood had increased to more than double the amount ordinarily present, viz., 530 parts in 1,000, in lieu of 215, the excess representing mainly fibrine and salts.

Urine.—With respect to this secretion, it was observed that during the premonitory stage, the amount was somewhat in excess, and of low specific gravity. During the period of lung congestion and sympathetic fever, the aqueous portion was lessened, but in the majority of cases not in any marked degree below the normal standard, specific gravity varying from 1015 to 20; reaction intensely acid; chlorides much diminished, but generally presenting a trace; phosphates in excess; colour much intensified in hue; urea varying in amount, always deficient, and sometimes totally absent; uric acid in excess, either free or in combination with ammonia and purpurine; on passage either clear and limpid, or ropy from mucus; the extent of deposition on cooling depending on the deficiency of urea and excess of uric acid and urates (in this case great), or *vice versâ*.

In one case, where the patient was suffering from an early stage of chronic renal disease, the amount of albumen present in the urine was excessive; in two cases co-etaneous with commencing involvement of lung tissue, there was a temporary trace, and in some a large quantity of mucus, all indicative of congestion of the renal tissue.

In reference to the chlorides, a slight trace was generally found in the cases of lobar pneumonia, even when consolidation was advancing. When the disease invaded an amount of tissue beyond this, in double pneumonia, or when a fresh access of inflammation ensued on the primary lesion, these salts were absent. A marked diminution was the rule, the amount varying in proportion to the extent of tissue implicated in the morbid action.

As hepatization advanced, the deposition of urates increased. After hepatization, and during the clearing up of lung tissue, the watery portion was normal; specific gravity averaged 1020; colouring matter still in excess; clear on passage, but immediately depositing free uric acid and urates with purpurine in abundance; acid reaction strongly marked; urea appearing and increasing towards normal amount, accompanied by a corresponding diminution of uric acid; chlorides have returned, and in excess above health. A gradual decrease in the acid reaction and amount of uric acid, colouring matter, and urates, with a restoration of the balance in respect to urea, phosphates, and chlorides, marking a restoration to health.

Thus, as usual with all febrile disturbance, the amount of the watery portion of the secretion was lessened, especially when contrasted with the great thirst. The active morbid changes in the air vesicles appeared to act vicarious to the kidneys in reference to the chlorides; the intense acidity was probably greatly due to the arrested secretion of mucous membrane of stomach; the increase of uric acid, and diminution or total absence of urea, is explained by the deficient oxygen entering the system, but as the actual excretion of nitrogenous elements may be said to have been but little below health, and as hardly any of these were obtained from the food, the amount secreted must indicate either an inordinate disintegration of tissue of body, or be looked upon as supplementary to some other excretion. Nothing approaching a crisis was disclosed by the urine. It would appear that the renal organs were in a congested state in the early period of lung inflammation, and excreted an amount of nitrogenous principles, acids, and colouring matter, larger in proportion to the aqueous portion than normal, and in reference to the two latter ingredients much in excess, in total quantity in 24 hours, above health, tending towards restoration of the damaged balance of elimination from system. The urea reappeared with the restoration of the respiratory process, the chlorides on the subsidence of the morbid changes in the vesicles, and subsequently in excess from re-absorption, while the great deposition of the urates demonstrated the extrusion from system of the disintegrated effete products of the air vesicles.

In the fatal case associated with early kidney disease, the amount of precipitated albumen equalled at least one-third of the total urine in bulk, and was accompanied by an extraordinary excess in the uric acid, urates, and phosphates.

Sputum.—In a few of the cases it was entirely absent; generally, however, it was present, increasing in quantity in proportion to the involvement of the bronchial tubes, and but small when the morbid action was limited to the air cells. Occasionally the first expectoration consisted of almost pure blood, somewhat brownish in hue, mingled slightly with viscid material giving it a streaky character. On microscopic examination this sputum was found to be made up chiefly of coagulated fibrine, and red blood corpuscles in two conditions: first, with ordinary characteristics and adhering in rouleaux; second, of a reddish brown hue; no distinction of colour between centre of corpuscles and the circumference; the biconcavity gone, yet still remaining flattened discs; no change on atmospheric exposure. Interspersed were clear cells (Plate I., Fig. 1) spherical or oval in outline, about $\frac{1}{750}$ of an inch largest size, acetic acid bringing into view large nuclei (1-4) and nucleoli, and fibrillating the matrix.

Succeeding this when present, or substituting it as the case might be, was the pathognomonic sputum invariably to be found in the expectoration, and characterised as follows:—Clear, glairy, and of thick consistence, entangling very few, if any, air bubbles, rusty coloured; its depth dependent on the

amount of contained blood, and sinking in water. Under the microscope it was found to be composed of coagulated fibrine, red corpuscles of blood in the conditions above-mentioned, white corpuscles not to be distinguished from the cells making up the major part of the sputum, in character like those before indicated, and varying from $\frac{1}{750}$ of an inch to $\frac{1}{12}\frac{1}{50}$; the larger ones (Plate I., Fig. I.) either containing two to four offspring cells in their interior, or extremely large nuclei, the smaller ones (Plate I., Fig. II.) in the majority large nuclei (1-2) and nucleoli; acetic acid rendered the cell-wall clear, and the nuclei more conspicuous, which by this process were often observed divided into 2-4 parts (Plate I., Fig. III.) indicating active growth. The matrix in which these cells existed was small in proportion, slightly granulated, and fibrillated with acetic acid. In chemical character, this sputum was composed of albumen and mucus, with a large amount of chlorides,* reaction neutral, or slightly alkaline.

This was the expectoration formed in the air vescicles, and observed from the first commencement of the lung lesion to resolution or hepatization of the inflamed tissue, varying in no particular, with the exception of the cells, which, in the early stage of congestion, were larger and less numerous than when the lung was advanced towards consolidation. Where the air vesicles merely were involved, this was the only sputum produced; but generally mingled with this,—which was sometimes streaked with florid or brownish-black blood,—were lighter-coloured parts, somewhat of a greenish hue, entangling air-bubbles, and composed of tessellated and elongated epithelium, enclosing large nuclei, nucleoli, and granules, free granules, with an occasional blood-corpuscle and cell, as above-mentioned (both evidently accidental). The site of production of this sputum was no doubt the medium bronchi, and in amount was proportionate to their involvement. When the larger tubes were affected, the expectoration was frothy, and of the well-known character. I am unable to say whether the absence of the chlorides distinguishes these chemically from the pathognomonic kind.

During consolidation, expectoration was generally present,—the sputum of the same naked-eye, chemical, and microscopic characters, with this exception: that the cells met with were generally of the smaller size, extremely numerous, and commencing granular; acetic acid in the majority, showing no division of nucleus, but, in comparison to their appearance during congestion of lung tissue, as though all active growth had subsided into a state of quiescence. No blood-streaks nor free blood characterised this sputum, nor the succeeding kind attendant on the restoration of patency of the air vesicles. Then the expectorated matter was slightly opaque and whitish, dependent on, and in depth proportionate to, the amount of fat globules present; reaction neutral; free deposition of chlorides from an aqueous solution. The microscope revealed the cells to be filled with granules and fat globules, floating in an albuminous and mucoid matrix (Plate I., Fig. IV.), the cell contents, frequently in a free state, to be seen extruding through the ruptured cell-wall; dark-brown blood corpuscles, with entire outline; shreds of cell-wall and fibrine, and an occasional phosphatic crystal. This fatty change could be observed in every gradation,—from the quiescent cell of hepatized lung, commencing granular, to its complete disintegration. The remnant of the cell-wall floating in a matrix mainly composed of the fatty *débris* of its previous contents.

Such were the changes observed in the sputum. As before stated, these cells (Plate I., Fig. I.) were present in the extravasated blood of lung engorgement, and in the earliest expectoration, while air was entering the inflamed vesicles, and consequently before consolidation had ensued, as well as in the sputum of those cases where no hepatization occurred from the disease resoluting from the first stage. During the congestion period, these cells were clearly in active growth, and increased in number as this stage advanced; hepatization was characterised by quiescence, and the restoration of patency of air vesicles was brought about through the medium of fatty degeneration, the *débris* being mainly removed by absorption. The opinion deduced by contrasting the

* In one case, on taking an equal quantity of blood and sputum, and obtaining an aqueous solution of each, the chloride precipitate was as dense in the sputum (possibly more so) as in the blood.

sputum phenomena with the accompanying phases of the lung lesion as revealed by the stethoscope was, that cell proliferation in the air vesicles was the agency in causing hepatization of tissue. Whether the origin of the primary cells is to be placed in those lining the air vesicles (assuming that they normally exist), or as germs in an inflammatory blastema, gradually exuded on the free surface of the vesicle; and what part, if any, the white corpuscles of the extravasated blood play in the process, is a debateable question. Certainly, the theory of "the blocking-up of the air cells being consequent on an "amorphous, coagulable exudation, converted into pus-cells for re-absorption," is not supported by any of the phenomena characterising these cases. The presence of chlorides and blood in idiopathic pneumonic sputum appears a *sine quâ non*. The altered dark-red corpuscle retained its cell form to the last, but swollen out into every conceivable shape.

In some four or five cases, the naked-eye aspect of the later expectoration was very suggestive of purulent change. It was easy to obtain masses in the same sputum. Demonstrating the gradations from the dim rusty to the ordinary whitish opaque (Plate I., Fig. IV.), up to the greenish-yellow hue of the extreme, which, under the microscope, presented a few cells of the ordinary character (Plate I., Fig. IV.), undergoing fatty degeneration; with others much smaller, of great tenuity and clearness of structure, very indistinct and irregular outline, with nucleus apparent without application of acetic acid, floating in a matux with fatty and albuminous granules (Plate I., Fig. V.),—on application of acetic acid, the nucleus being rendered more distinct, but with an obliteration of its surrounding matter and cell-wall. No cells at all characterising purulent formations could be found; but a careful examination of the sputum gradations demonstrated,—that this *primâ facie* purulent degeneration was intrinsically but a modification of the fatty transformation; that the cells, instead of undergoing the usual gradual retrogression of their contents into fat granules, and coalescence of these into globules, subsequently set free by cell-wall rupture, with no distinction of nucleus, had burst before their proper time,—the nucleus carrying with it a certain amount of attached solid material of very irregular outline; and the albuminous and fatty granules, diffused in the matux, forming an extremely opaque, greenish-yellow mass, presenting the naked-eye characters of pus. These cases were all in debilitated or deteriorated constitutions; the change of the sputum above-mentioned was sudden, and followed immediately on the occurrence of hepatization,—*i.e.* on arrest of growth of the cells in the air vesicles.

Morbid Anatomy and Pathology.—Venous congestion of skin and internal organs were present, as well as the ordinary conditions due to pleuritic and bronchitic complications. The right side of the heart was flaccid, and filled with black blood and fibrinous clots, extending up the distended pulmonary arteries; pulmonary veins comparatively empty, and left side of heart contracted, containing a small quantity of black fluid blood. Pulmonary glands enlarged.

On section of the inflamed lung, it was possible to note three distinct stages, not that they were accurately and clearly defined, but portions might be taken where each stage was in the ascendant,—the intermediate tissues merging into one or the other forms.

1st. A portion, of a dark renous hue, in a state of great engorgement; crepitating, but below ordinary; swimming in water, but not so buoyant as usual; tough; on section, exuding freely mingled blood and air; capable of being changed somewhat towards healthy aspect by washing and pressure, with great diminution of density. On microscopic examination, in those parts least removed from healthy tissue, the only abnormal appearance was an encroachment on the area of the air cells from the distended state of the vessels, with the circumference of the interior of the vesicles lined with a layer of cells, oval or spherical in outline, from $\frac{1}{750}$ of an inch to $\frac{1}{1200}$ in size (Plate II., *a*); transparent, with distinct nucleus. In more congested portions, these cells were more numerous, with stronger definition of outline; the nucleus and nucleoli evidently in multiplication (Plate II., I. and II.). Occasionally, a vesicle could be found, in which extravasation of blood had occurred on coagulation, assuming the spherical outline of vesicle, and associating with a few of the cells lining the interior (Plate II., *b*, *b*).

2nd. A portion of dark renous hue, yet not to such an extent as the former; uniform in colour; not crepitating; sinking in water; friable; easily broken down by finger; containing no air; on section, oozing blood and glairy, tenacious fluid; on pressure, becoming lighter in appearance, and exhibiting a beaded granular surface, of a reddish, gelatinous aspect. On microscopic examination, the air vesicles were found to be completely filled with cells, touching each other, with no appreciable intercellular space (Plate II., *c.*), these cells (Plate II., III.) averaging about $\frac{1}{1000}$ of an inch; the largest, in the minority, with double or triple nuclei and nucleoli; the smallest, with single nucleus and nucleolus. Intermediate stages of growth of these cells could be easily demonstrated; and interspersed among them were altered red corpuscles of blood, which occasionally could be seen aggregated together, forming a clearly-defined spherical stratum in the cellular contents of the air vesicles.

3rd. A portion yellowish-grey in appearance; opaque; mottled; granular on section, and of increased density; non-crepitating; very friable; pressure and washing slightly reducing the mottling, and rendering the surface more uniform in colour; occasionally exuding a creamy fluid. On microscopic examination, the air vesicles were seen to be completely filled with cells undergoing disintegration and their *débris* (Plate II., IV.), the cells filled with granules and oil globules in abundance, often ruptured,—the extruded material forming a granular and globular stroma, for the most part soluble in ether. The fibrous tissue of the air vesicle was swollen and granular, and was seen to break up into small fragments by slight pressure on the specimen under the microscope.

A most careful examination failed to disclose any vesicle swollen out and solidified by the presence of clear, granular, inflammatory exudation. The first appearance of abnormal change consisted in an encroachment on the area of the vesicles by the congested blood-vessels and the cells before-mentioned; by active growth and multiplication of these latter, hepatization was brought about; and by absorption and expectoration of the *débris* consequent on fatty degeneration, the air vesicle was cleared of its contents. The appearance of these cells, and their phases of growth and decay, as exemplified in the morbid anatomy of the disease, coincide with the sputum phenomena, and mutually support the inference that cell prolification was the agency in causing hepatization. Their general character, as detailed in Plate II., *a*, would render it highly probable that they originated in the cells (generally admitted to exist) lining the inner free surface of the air vesicle. The variation of colour and aspect presented by the inflamed lung depended on the modification of the natural state, resulting from increased amount of blood in the vessels, and the changes ensuing in the morbid contents of the vesicles. Of all the stages of pneumonia, the first was that in which the lung tissue presented the darkest venous hue. During the second stage, owing to the vesicles being completely cell-filled, and their intersesicular tissue, with vessels, receiving firm support or even pressure, a necessary diminution in the quantity of blood in the vessels, relative to that present in the first stage, was brought about, and corresponding loss of intensity of colour; while the opaque hue of the third or disintegrating stage was produced by the innumerable quantity of fat globules and granules of cell degeneration in the air vesicles,—the mottling resulting from the interspersed normal hue of intersesicular tissue, lung pigment, and blood-vessels. There was no purulent infiltration, nor development of pus cells in the "exuded material," to account for the grey hepatiation, which undoubtedly had its origin, like the opacity of the sputum, in the cell change. The fibrous tissue of the intersesicular substance was swollen out and granular, with a great tendency to break up into fragments, explanatory of the loss of elasticity of lung tissue continuing so long after returned patency of the air vesicles.

Etiology.—With the exception of nine isolated cases occurring indiscriminately, the bulk of the disease was limited to the first quarter of 1867—January furnishing 12, February 20, and March 11; the former month being the one of greatest cold, the two latter of greatest temperature variation. It is a very difficult problem to solve how far climate, *per se*, acts in producing disease, either as exciting or predisposing cause; and to estimate at their proper value, in arriving at a right conclusion, those influencing, yet often remediable, conditions peculiar to the individual, his calling, or to the circumstances under which he may be temporarily cast, the concurrence of which, with climatic

causes, so often induces illness. It is especially so with the disease in question, the range of which is comparatively limited to cold months of the temperate and northern climates. Considering the vast number of individuals, healthy and weakly, who pass through a northern winter without suffering, in any deleterious degree, from the lowness of temperature, provided that an ordinary amount of care be taken in preserving the body against its effects, in conformity with what nature suggests and experience enforces, it is impossible not to arrive at the conclusion that in this disease, as in many others, the climate is made a scapegoat for ignorance and carelessness. Of course it may be utterly impossible for persons of extreme delicacy of constitution, diseased state of body, or during adventitious great exposure liable to occur to all, to guard against the rigours of cold; yet it may be stated in all fairness, that to an ordinary healthy individual, of average carefulness, under ordinary conditions, there is nothing inimical in cold *per se*, such as characterises the winter of New Brunswick. Its evil effects are seen in the very young, in the aged, in those unable to withstand it from bodily deterioration, or temporarily brought within its grasp by fortuitous or preventible circumstances,—to wit, bad housing. The distribution of the regiment during the prevalence of the disease was as follows:—330 men at the Exhibition building, a large wooden structure intended for the purpose its name designates, well-situated, freely exposed on all sides, admirable as a summer quarter, but at the period specified, from its numerous cracks and fissures, thinness of walls, and general lightness of construction, not affording sufficient protection against the inclemency of the winter,* and only temporarily occupied; 256 men in permanent barracks, with ordinary securities against cold; and 66 married men in lodgings, scattered throughout the town, and consequently under much the same condition as the poorer inhabitants. The attacks furnished by the occupants of these respective quarters were as follows:—Exhibition building, 38; permanent barracks, 9; lodgings, 4; cells, 1. But by eliminating all these cases, where clearly the exciting cause of the disease was otherwise, a resultant is obtained of 7·9 per cent. of the occupants of the Exhibition building suffering from pneumonia, due essentially to conditions accruing from imperfections in this barrack, the other quarters furnishing but three cases, questionably traceable to a like cause. There is no doubt that the exciting cause of this 7·9 attacks per cent. of occupants was exposure of the body during the night to cold currents of air, and lowness of general temperature. Of the seven compartments into which the Exhibition building is divided (four upper and three lower), the four whose aspect was that of the predominating cold winds (viz., north and west), and consequently most liable to depressions of temperature and cold currents of air, gave 18 out of the 27 cases traceable to the building defects, while the comparatively warm lower rooms only furnished 2. Except in the faulty character of the barrack occupied, the men in this quarter differed in no respects from the rest of the battalion; and their contrast with the others, on the score of health, is so marked as to leave no doubt of what has been already stated as to the agent at work in producing this inferiority.

Thus, to the sanitary defects of the Exhibition barrack already enumerated (viz., draughts and lowness of general temperature, especially at night), must be ascribed the exciting cause of 27 attacks—January 12, February 10, March 5: 7 followed the careless stuffing of mattresses with damp snowed straw, 5 exposure to great cold at night (2 whilst attending to sick children, 1 on duty, 2 whilst drunk), 6 chilling of body whilst perspiring from strong exercise, 3 questionably attributable to permanent barracks, and 4 only in which climate, *per se*, could be considered the exciting cause (of these, 2 were in a deteriorated state of bodily health from drunken habits of life, and 2 occurred during great temperature variation). Thus it is clear that it is impossible to assign *climate* as the agent in the production of the majority of the cases, except in furnishing one factor, the lowness of temperature, which, combined with the accidental concomitants of bad housing, predisposition,

* At the present time, January 1868, from numerous improvements suggested by experience, and an increased allowance of fuel, the building has been converted into a fair winter quarter; the beneficent results accruing therefrom are of the most marked character.

preventible or fortuitous conditions, originated the disease in question. However, in whatever method brought about, chilling of the body appeared in all the first phase of the malady.

Of the 52 cases, 30 were in previous good bodily health, and in 21 predisposing causes existed as follows:—Delicacy of organization, 7; deterioration from drunkenness, 7; from syphilis, 2; from previous lung affection, 2; incipient kidney disease, 3. But in taking into consideration how far actual bodily deterioration rendered certain of the men more liable to be impressed by external agencies than the rest, it must not be lost sight of that two temporary influencing conditions existed, by which, as it were, the exciting cause of the disease was met half way; and this is the more necessary, since that there is every reason to believe that this temporary depression of bodily function, clearly preventible, characterised many of the cases ascribed to barrack defects. The one condition was previous debauch, during which (generally) semi-intoxicated state, the blood impregnated with bad alcohol, the individual was exposed to cold, either before entering barracks or subsequently during the night, often waking up with the body chilled, from the clothes being tossed off; so frequently was this considered by the patient himself as the starting-point of the malady, that it was impossible to have a doubt of the truth of the statement. The other was an over-surfeited state of system, consequent upon excess of food in relation to exercise. There is no reason for supposing that the previous six years' service in the enervating climate of Malta produced any susceptibility to the rigours of a North American winter, except as having possibly brought about some of the predisposing agents. The women and children, who were equally under this influence, suffered but slightly from the bracing cold, only two cases of pneumonia occurring among 70 women and 82 children.

Pathology.—The chilling of the body, and more especially its surface, being the first phase of the affection, the important question arises as to the nature of the immediate change brought about, as well as the rationale of the process resulting in lung lesion. The mere deterrent property of cold, by virtue of which the blood is diverted from the surface to the internal organs, producing hypnœmia, cannot be claimed as a sufficient explanation, in face of the frequent and innocuous nature of the occurrence, especially when dependent on a great degree of functional activity, and perfectly compatible with continued healthy action. The general symptoms preceding the lung lesion were those associated with arrested secretion of the body, more especially the skin, and retention in the system of effete products, the local affection being secondary, and generally corresponding to the intensity of the former. The primary duskiness of skin, drowsiness, and nervous depression, together with the change in the blood very early during the stage of lung engorgement, as elucidated by the microscope, indicated a contaminated condition of the vital fluid, followed by congestion of internal organs, and inflammatory action in the lung, with sympathetic disturbance of system.

Next in the order of sequence were the reinstation of the skin secretion, with augmented action of kidneys; and as hepatization of the lung ensued, it was accompanied by a gradual improvement of the general symptoms, especially those expressive of blood purification, possibly consequent on cell proliferation in the air vesicles, as well as those due to the local morbid action. How far such improvement in these symptoms was dependent upon the accumulated products in the air vesicles, or the associated renewal of the secretions, is a difficult problem to solve; or which played the greater part in the process; but the relief itself was unquestionable, and the tendency to further spread of the local lesion, appeared exactly to depend upon tardiness in restoration, or absence of freedom of performance, of the skin and kidney functions. The restoration of the normal secretion of the mouth, stomach, and intestinal tract, was the last to be brought about. Re-absorption, following fatty degeneration of their contents, was the main process in reproducing patency of the air vesicles; and the anæmia characterising the convalescence demonstrated a deficient production of red corpuscles during the disease.

The main pathological features characterising these cases were that a primary morbid condition of the blood constituted the *fons mali*, that the secondary lung lesion was consequent upon it, and in extent equivalent to its

intensity, and that the products of inflammation in the lung, combined with reinstated secretions of body, were the outlets chosen by nature for purification of the system and renewal of healthy action.

The occurrence of pneumonia in chronic kidney disease, in alcoholic poisoning, and during the exanthemata, strongly support the inference of its general sequence to an *à priori* vitiated state of blood.

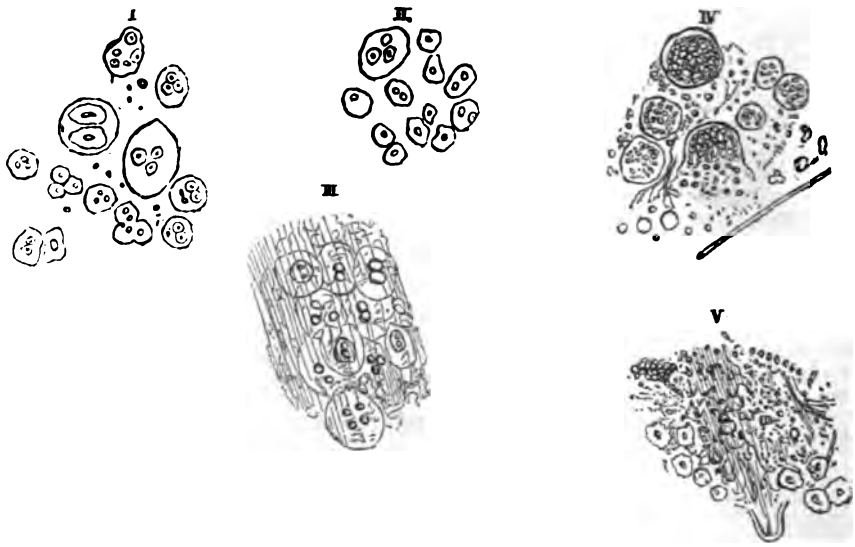
Treatment.—The treatment pursued in these cases was medically but slight, yet the proportion of recoveries to attacks is extremely satisfactory—52 cases followed by only two deaths. Of those fatal, one occurred in a young fellow with incipient kidney disease, and in which the spread of the inflammatory affection to almost the whole of both lungs, which caused death by asphyxia, appeared mainly due to this complication; and the other, in a constitution broken down by syphilis and drunkenness, the whole of one lung and major part of the other being primarily involved, with consequent asphyxia. No attempt was made to cut short the disease, the main features of the treatment pursued being to relieve the pleuritic complication, when existent, as quickly as possible, by cupping or blistering, with warm soothing applications, on account of the great augmentation of dyspnœa consequent upon it, as well as the prostration and interference with rest from associated pain; to restore the various secretions of skin, kidneys, and intestinal canal, by means of diaphoretics, diuretics, and mild purgatives, and especially antimony in small doses (gr. $\frac{1}{12}$ every fourth hour); to obtain sleep by morphia or other narcotic drug; to relieve the accompanying thirst, and support freely the system by fluid nutriment and alcoholic stimulants; to place the patient in a good equable warm atmosphere; and to allay the irritable, persistent cough, consequent on the associated and often protracted bronchitis. In some few of the cases, the treatment, so far as the exhibition of drugs was concerned, was nil, yet recovery did not appear to be protracted therefrom. The tendency, in the uncomplicated affection was towards recovery in individuals of average stamina, the dangerous features being—a primarily extreme amount of lung tissue involved, threatening asphyxia, and indicated by intensity of premonitory symptoms and especially duskiness of countenance; or the same brought about by a subsequent extension from a primary moderate inflammatory lesion, consequent on diseased condition of depurating organs, or deficient elimination from other sources—a constitution much deteriorated by disease or vice, or severe complication of bronchitis or pleurisy. The condition characterising all, from the earliest commencement, was asthenic. During the first stage, *i.e.*, engorgement of lung tissue, dyspnœa was the most prominent symptom of the local lesion, but even when the extent of tissue involved was the whole of one organ or lower lobe of both, there appeared but little tendency to death by asphyxia in uncomplicated cases, and this was reduced to a minimum when merely one lobe was implicated. The dyspnœa was proportionately much greater, and consequently a more dangerous symptom, when bronchitis or pleurisy was superadded to an average extent of vesicular involvement, than in any case where the latter was beyond the average, but without the complication. During the second and succeeding stages asthenia and anæmia were the main conditions requiring to be combatted, and experience soon taught that it was far better to anticipate these by the frequent administration of liquid nutriment and moderate alcoholic stimulants, especially when the patient was deficient in bodily stamina, a suckling woman, or young child. In one case of double pneumonia, where the disease did not advance to hepatization of lung, the cutting short of the process appeared to be the resultant of extreme action of the depurating organs, the kidneys, intestines, and skin, primary set in operation by nature, and assisted by exhibition of medicinal agents. As has been before stated, the pathological indication was, that a retention of effete products in the blood constituted the *fons mali*, and that the intensity of the premonitory symptoms resulting from this, especially the duskiness of skin and drowsiness, foretold generally an ordinary or extreme involvement of lung tissue. On this hypothesis, the cutting short of the disease by blood-letting receives but little support; by general abstraction by blood, no doubt a certain amount of offending material is taken from the system, and possibly in some few instances of extreme plethora or in the endeavour to relieve the threatened asphyxia from great engorgement of lung tissue, may be productive of good; but in the majority

of cases the rule would hold, that the amount of nutriment lost to the system by this process of treatment more than counterbalances the questionable good to be obtained, and especially since the condition of the system consequent upon the disease is decidedly asthenic, an undoubted impetus is given towards protracted convalescence, or even death. Of course these remarks do not apply in any force to the local abstraction by cupping to the small extent of three or four ounces in pleurisy complications. The good effect of this measure was so extremely marked, and so immediate in its operation of relief of the consequent intensification of the dyspnœa, as to be resorted to without hesitation. If the extent of lung implicated be capable of curtailment, the natural history of the disease tends to the inference that it will be by early ridding the system of the noxious offending material through the depurating organs, the skin, kidneys, and intestines. Again, in none of these cases was there any attempt made to assist or expedite nature in the removal of the consolidation by administering medicines, "aiding absorption or disintegration." When any length of time was occupied in this process, it was always in bad constitutions, with accompanying great debility, and tonics, medicinal and dietetic, by improving the stamina of system, proved the best absorbent remedies. A want of natural rest, and consequent extreme weariness and prostration, were invariably present, and as frequently relieved by the exhibition of morphia or hyoscyamus; the valuable properties of these drugs, both in respect to procuring sleep, in allaying general systemic irritation, and in combination with alcoholic stimulants on the occurrence of delirium, were extremely marked, especially as this latter was expressive of nervous exhaustion. On no occasion did narcotics in moderate dose show any tendency towards increasing the dyspnœa, or any symptom of blood impurity; their beneficial results in this disease cannot be too strongly stated.

The pallidity of countenance and anæmia marking convalescence required to be met by tonics and good diet; all active treatment was essentially limited to the engorgement stage of the disease.

The indications for treatment were—to place the patient in an equable warm atmosphere; to endeavour to obtain a restoration and increase of the secretions of the skin, kidneys, and intestines, for possible limitation of primary extent of lung involvement, or subsequent spread; to remove the dyspnœa and associated pleurisy, and relieve pains by warm external applications; to supply freely assuagers of thirst and liquid nutriment, with a careful attention to the least flagging of system: to procure sleep; during consolidation and clearing up, free dietetic support, with a fair amount of alcoholic stimulants and exhibition of mineral tonics for the anæmia.

PLATE I.—Microscopic Characters of the Sputum in Pneumonia. × 200 diameters.



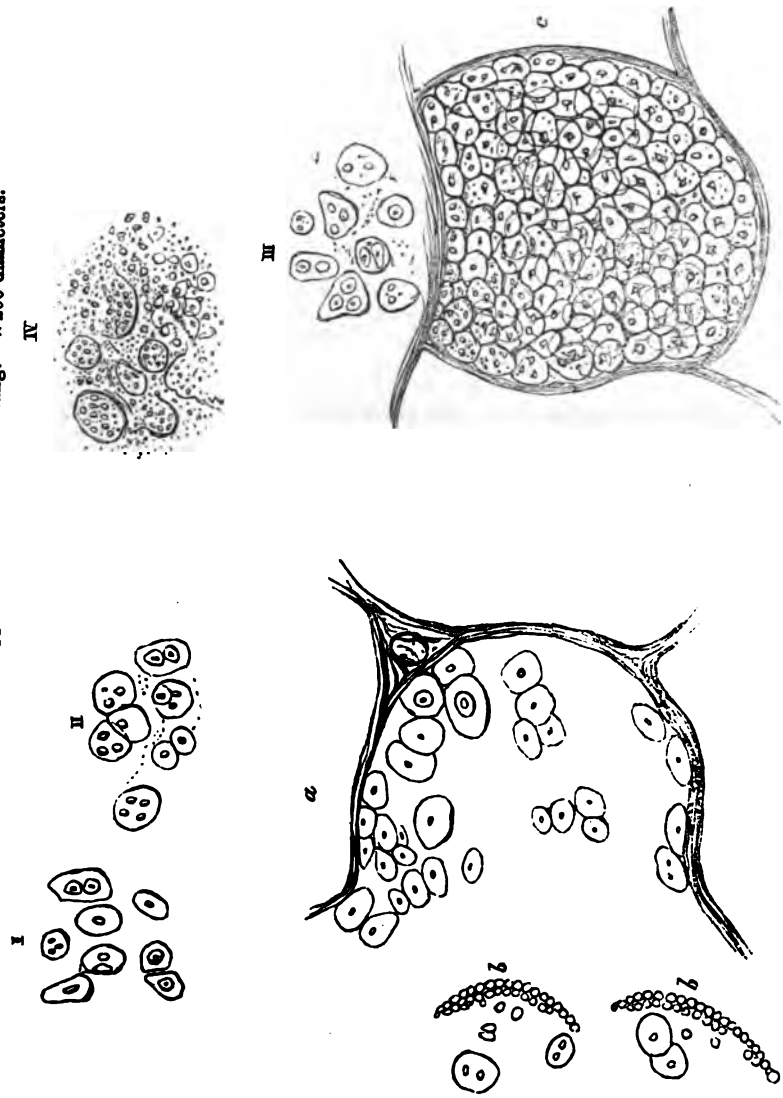


PLATE II.—MICROSCOPIC appearance of Pneumonic Lung. × 200 diameters.

APPENDIX No. X.

TRANSPORT OF TROOPS AND INVALIDS IN INDI .

Medical Department, British Troops,
Inspector-General's Office,
Simla, 31st May, 1867.

Sir,

In reply to, and in compliance with, the instructions contained in Military Department Docket, No. 526, of the 14th of February last, I have now the honour to submit the accompanying Memoranda on the amount and nature of the accommodation which it is considered it will be necessary to provide for sick soldiers proceeding by rail from the several stations in this Presidency, either in the course of ordinary relief, or when *en route* to Bombay for embarkation to England, by the new line of steam transports.

I have, &c.,
(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals, &c.

To the Secretary to the Govt. of India, Military Dept.

Hospital Arrangements on and along the Line of Railway to Bombay.

31st May, 1867.

In acknowledging the receipt of the communication, as per margin,* I have the honor to state that in January last the minor question of railway accommodation for the sick of regiments, moving in course of relief, in this Presidency, was forwarded for my opinion by the Quartermaster-General of the Army, in consequence of a representation made by the Surgeon of the 2nd Battalion Rifle Brigade, with regard to the inadequacy of the railway arrangements in this respect, as experienced during the move of the battalion from Meerut to Agra in November last, and from Agra to Calcutta at the end of the same month.

2. A copy of my reply to Major-General Paton is hereto appended, and in it (paragraph 4) it will be seen that it was anticipated that the larger question must come up at no distant date.

3. In that memorandum to Quartermaster-General I have alluded to one change, not a very extensive one, which will probably result from the new transport arrangements, which is, that when regiments are ordered home they will take with them all the invalids present with the corps, although (especially if moving early in the season) they may not be able to take those men who are absent at hill depôts.

4. Independent, however, of the smaller number of invalids belonging to regiments which are ordered home, there will still be the great mass of the invalids of each season, belonging to regiments remaining in the country ; for these especially railway hospital arrangements will have to be made.

5. It may, I presume, be taken for granted that as soon as the line of rail is completed and open through to Bombay—in fact, as soon as it approaches completion, the question of halting accommodation at suitable intervals along the whole line will be considered, as even healthy men when making long journeys will require regular halts during every 24 hours.

6. The first halt in the day should be in the early morning, from about 7 till 9 A.M. During this halt, the men, of course, would breakfast, wash themselves, and make any necessary change of clothes ; the second halt should be in the afternoon, and probably the best hours for it would be from 3 or 4 till 6 or 7 o'clock. During this second halt the men would dine, and after a

* No. 525. Extract from the proceedings of His Excellency the Governor-General of India in Council in the Military Department, 14th February, 1867.

suitable rest would go on for the night, when it was arranged that they should so travel.

7. An important question, however, here arises, which is, how long (that is during how many consecutive nights) can men travel by rail without an intervening night's rest? My opinion is that they cannot, especially in a tropical climate, stand more than one night without great discomfort, and, most probably, injury to health.*

8. This opinion may seem extreme, and it may be said that officers and other individuals of the same class constantly travel without stopping, from Calcutta to Delhi, which is a two night's and two day's journey, the third night being not unfrequently added. It is quite true that this journey is constantly made without halting and without much discomfort, and with no injury to health, by first and even second class passengers; but then it is to be remembered that both first and second class passengers may have a very good night's rest in a railway carriage; private soldiers, who have merely sitting room, can have no night's rest, nor any refreshing sleep whatever; therefore to undergo even 48 hours, and, much worse, 72 hours of this condition of things, must be productive of discomfort and misery in the extreme, especially when the heat of the day has toward evening made the men thoroughly exhausted.

9. I conceive, therefore, it will be absolutely necessary that in addition to halting places for food—at least two good meals a day—there should be halting places (or standing camps pitched) at which the party travelling can halt every second night. This suggestion is made with regard to men in health.

10. With regard to invalids, as they will almost invariably travel in the cold season, I am of opinion that it would in every way be advantageous to this class if their journeys were so arranged as to admit of their travelling all day and resting all night, as carriages with sleeping arrangements can only be provided, at least, it is presumed, only *will* be provided for a certain proportion of the worst cases.

11. The arrangement of day travelling and night resting would of course lengthen the period of the journey to Bombay by two or three days from Allahabad. This, in a sanitary point of view, would be no disadvantage, while the avoidance of any undue fatigue which would be ensured by continuous good nights' rest, would be of the utmost benefit to the more weakly men.

12. These halts could easily be arranged by having, during the cold season, standing camps along the line, so distanced from each other as to make the run an easy 10 hours' one, with a halt for a mid-day meal; the evening meal being taken after arrival at the halting place, and the morning meal before starting.

13. As Allahabad will be a central point of meeting for troops coming up and down country in course of ordinary relief, as well as for those arriving from the port of disembarkation, and for those proceeding to embark, it will probably be found necessary to have a permanent depôt at this station, which has the advantage of being more central, and in September, October, and November is more healthy than Jubbulpore.† Any permanent depôt buildings which might hereafter be decided upon would, no doubt, be close to the railway; but for a year or two, until the necessity or otherwise for having a depôt at Allahabad has been established by actual experience, either the Mansfield or the Chatham lines would afford sufficient accommodation, while a moderate ambulance establishment would meet any difficulty about distance, and be a cheaper way of meeting the requirements than that of erecting buildings near the railway, which actual experience, obtained after the transit arrangements are fully organised and in perfect working order, may prove to be no longer necessary.

14. As to the actual invalid accommodation on the rail—that is, the

* That is, if they are travelling day and night. If men only travel at night, they can rest and sleep during the day.

† It was afterwards agreed, in communication with the Quartermaster-General, that Jubbulpore would be the most convenient halting place, the chief reason being that at Jubbulpore the East Indian Railway ends, and the Great Indian Peninsular begins, so that at Jubbuldore there must be a general transfer from one line to the other, and invariably a halt.

number and size of carriages so fitted, that in them men can have beds and all the appliances of a hospital ward, which will in all likelihood suffice to meet the requirements of regiments proceeding home overland by the Central India and Bombay route, I think there should be bed accommodation for at least three per cent. of strength, as, I presume, all invalids actually present with the corps, when the order for it to move arrives, will proceed with their regiments. In the case of men who may happen at the time to be at any of the hill depôts, their proceeding with their regiments might, in many cases, be quite impracticable, as the regiments first to embark will go on board ship in September.

15. With regard to large parties of invalids belonging to regiments not going home, I would recommend that hospital accommodation should be available for at least 18 per cent. of strength. In my memorandum to Quartermaster-General (copy of which is appended) I said 15 per cent.; but since I sent in that paper, having thought further over the matter, and got what information I could from others, I have come to the conclusion that in many batches of invalids there will be 15 per cent. for whom beds will be required at starting, while 3 per cent. extra should be available for others who may fall sick on the journey.

16. It is almost impossible to get actual statistics from any records in this office on the percentage of patients actually requiring dhooly conveyance in ordinary batches of invalids, as the numbers of men requiring different kinds of carriage and of those able to march are not shown separately; but as indents are sent in from each corps for carriage, copies of these indents, if kept, and the strength of the party, would give some information. The Surgeons of several regiments have consequently been applied to, asking if this information can be given, and if it can, it will be ascertained on receipt of the replies if any general deductions can be drawn from it. If there can be, the information will be sent in to Government supplementally.

17. Suitable plans of the style of carriage which will be required for hospital purposes might probably be obtained from the Locomotive Department of the East Indian Railway,* to which department could be communicated the essential requirements of each carriage. I do not think they (the carriages) need be in any way different in shape from the ordinary ones, but might each contain 6 or 8 beds (lengthways), being 3 or 4 in one row on each side. To give this number, the carriage would probably require to be at least 24 feet in length for 6 beds, and 31 for 8.† This latter is not, by 10 feet, as long as were the hospital carriages in use on the great lines in America during the war with the Southern States.

18. There would of course be a door near centre of carriage on each side,‡ also room for some watercloset arrangements; and besides the beds, a few easy chairs would be useful. A stove also would be required in at least one of the carriages in each invalid train, to provide the means of warming water, and preparing simple articles of nourishment.

19. During the late war in America, the arrangements, especially towards the later periods of the contest, for transporting the sick and wounded along the different lines of rail, are reported to have been very complete. The following extract from "Army Hygiene," by Deputy Inspector-General Dr. C. A. Gordon, C.B., gives an account of the carriages which were used for the above purpose. The adjustment of the beds, by means of india-rubber tags, seems a very necessary and advantageous arrangement, which must have added to the comfort and ease of the sick and wounded:—

"Upon the various railroads communicating with the armies and hospitals,

* This was done, and a very good plan of carriage furnished, in which, however, one or two minor alterations were suggested by the Quartermaster-General and myself, and carried out by the designer.

† If an upper tier of beds can be arranged, it would greatly economize space, and there are no sanitary objections that I am aware of to having two tiers.

‡ In the plan furnished the doors were close to one end, this the Quartermaster-General and myself considered to answer quite as well as having the door in the centre.

"were twelve or more hospital cars in daily use, all fitted up with special refer-
"ence to the comfort and safety of the patients. These railway ambulances had
"all the furniture and appliances of a good hospital. The beds were adjusted by
"means of india-rubber tags, so as to give security and ease. There were special
"arrangements for ventilation and light; ample stores of bedding, clothing, and
"comforts; a culinary apparatus, and ample stores of water. The carriages had
"also the advantage of being so fitted as to run on different gauges of lines of
railway."

20. Some of these carriages were 41½ feet in length, and 8 feet 7 inches in breadth: each such carriage being capable of conveying 24 men in beds,* 4 on sofas, and 6 on easy chairs, besides a Surgeon and 3 attendants.

21. In one of the many interesting accounts of the Medical and Surgical history of the late war in America (viz., Circular No. 6, War Department, Surgeon-General's Office, Washington), at page 84 it is remarked,—"Through-
"out the war, the system of rapidly removing the wounded to permanent hos-
"pitals remote from the scenes of hostilities was uniformly adopted. To accom-
"plish this, trains of hospital railway cars were constructed, and steamers were
"fitted up as hospital transports, or were built expressly for that purpose. The
"hospital cars were furnished with moveable berths or litters, and in each train
"one car was provided with facilities for cooking." Following these remarks there is a drawing† of the army hospital car which was chiefly in use on the United States railways during the war.

22. And there is added,—"During the siege operations in front of Peters-
"burg, the sick and wounded were conveyed by rail from the hospitals near the
"trenches to the central avenue of the Great Base Hospital at City Point, and
"unloaded at the doors of the wards."

23. It may be well to bear in mind that, in this country, hospital arrangements in connection with the transport of troops along the lines of railway, which are now being considered solely with the view of meeting the requirements of ordinary and peaceable times, may any day have to be utilized to meet the requirements of a time of war.

24. I have not alluded to having any regular hospital accommodation at places along the lines; for with well-fitted carriages, furnished with all appliances, and with medical aid always at hand, it will seldom, if ever, happen that there can be any necessity for leaving any man behind. If, however, such a necessity should at any time arise, there will be available hospitals at, as well as above and below, Allahabad, and again at Jubbulpore, and probably at some station between Jubbulpore and Bombay. Nagpore (Kamptee) cannot of course be calculated on, as the main line of rail will not touch that station, nor approach near to it.

(Signed) G. S. BEATSON, M.D.,
Inspector-General of Hospitals, &c.

No. 128/c.

Medical Department, British Troops,
Inspector-General's Office,
Calcutta, 29th January, 1867.

Memorandum.

In returning the enclosures as per margin,‡ and in reply to No. 87/c of the 10th instant, from the Quartermaster-General, the Inspector-General has the

* This seems to indicate very clearly that there must have been two tiers of beds.

† This drawing shows there were three tiers of beds.

‡ Meerut Division Endorsement, No. 860 A, dated 3rd December, 1866, with the following annexures: 1. Letter dated 19th November, 1866; 2. Letter dated 24th November, 1866, from Surgeon Fraser, 2nd Battalion Rifle Brigade. Meerut Division Endorsement, No. 926 A, dated 20th December, 1866, covering Memorandum No. 938, dated 15th December, 1866, from Dr. Guise, Deputy Inspector-General of Hospitals, Meerut Circle, regarding hospital accommodation for regiments when being conveyed by railway.

honor to observe, that when the whole of the sick of a regiment can be left behind, on the occasion of a corps being ordered to proceed by rail, one wagon, with four beds and four sets of bedding, would in ordinary circumstances be sufficient to meet the casual cases of sickness occurring during a railway journey.

2. It may, however, be a question whether it will always be convenient or desirable to leave the sick behind. In the case of a regiment proceeding to the port of embarkation to embark for England, we will say on board one of the new line of naval transports, it would probably be a matter of regimental convenience, and would be better for the sick, to let all go with their regiment, except those cases which could not be safely moved. In this case, four or five times the accommodation specified by Deputy Inspector-General Dr. Guise would be required; and in addition to several wagons fitted up for patients and attendants, there should be one wagon, next to those appropriated to the sick, for the Hospital Serjeant and medical subordinates; and in this wagon there should be a field chest supplied with medicines and medical comforts.

3. Hitherto there has been a difficulty and an objection to sickly men going home with their regiments instead of going as invalids. The reason why it has hitherto been expedient to send them home as the latter, viz., to ensure better accommodation,* will not obtain in the naval transports, on board which there will be every convenience for men in health, as well as for those who are sick.

4. In considering this question of hospital accommodation on the journey by rail, the time is now fast approaching when provision must be made for the conveyance of invalids by long rail journeys through Central India to Bombay. For this class of men we cannot safely calculate that less than 10 per cent. will require regular hospital accommodation; so that if batches of 300 invalids can be hereafter sent by one train, accommodation and equipment for 30 bed-ridden men will be necessary, plus 4 or 5 per cent. for casual cases of illness occurring during the journey, in all for (say) 15 per cent.

5. In each invalid carriage there will require to be some privy accommodation for the weakly men who cannot leave the carriage; and there should also be some arrangements for preparing such food as may be necessary during periods between the several halting-places.

6. For the invalids generally it will be most important and essential that their journeys and halts are so arranged that the men shall have at least two good and comfortable meals—breakfast, and a meal about two or three o'clock in the afternoon—during each 24 hours; and the halting-places should be so arranged as to admit of a good night's rest, when the journeys are made in the cold season, as they generally will be.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals, &c.

To the Quartermaster-General.

Arrangements for the transport of healthy troops and invalids along the several lines of rail, and more especially in view of the annual transport of regiments and parties of invalids to and from Bombay, agreed on by the departments of the Quartermaster-General and Inspector-General of Her Majesty's Hospitals in India (and approved of by His Excellency the Commander-in-Chief in India), with reference to my Memorandum to Secretary to Government in Military Department, No. 6, dated 31st May, 1867.

1st. It may be laid down that the troops and invalids will almost invariably travel at night, and that when they do, they can travel twelve hours without regular meals.

* The passage money for invalids has always been higher than that paid for men in health, as the Government of India required that invalids should have more space than healthy troops.

2nd. There will be the following halts between Allahabad and Bombay:—1st, a depôt at Jubbulpore; two rest-houses between Jubbulpore and Deoli, at which latter station there will be a depôt, from which it will be one night's run into Bombay.

3rd. I recommended in my Memorandum to the Government of India that the depôt should be at Allahabad; but I now see good reason for preferring Jubbulpore, the latter being the terminating points of the East India and Great Indian Peninsular Railways. This fact will necessitate a halt at Jubbulpore in all circumstances, as carriages, baggage-wagons, &c., must all be changed. Were the depôt at Allahabad, two halts would be unavoidable instead of one.

4th. There will be at Deoli a general receiving depôt for men arriving from England, as well as for those proceeding to Bombay for embarkation. The accommodation to be sufficient for two shiploads.

5th. There will also be hospital accommodation at Deoli for the usual percentage of sick to a strength of 1,800, and the same at Jubbulpore.

6th. At the two intermediate halting stations there will be no special hospital accommodation, as, with properly fitted carriages, and proper selection of men at Jubbulpore and Deoli it will not be required.

7th. If the men are required to travel by day, they should have one good meal before they start in the morning, and their next full meal on arrival at the end of the twelve hours' stage, with some light nourishment midway. This mid day meal to be bread and cold meat, which they can always take with them.

8th. No stage to exceed twelve hours without halting; such (as I am informed by Quartermaster-General) being the invariable practice at present.

9th. In reply to a question from the Government of India as to "whether "the meal recommended by Dr. Beatson has hitherto been found necessary," the Quartermaster-General replied that the practice hitherto in Bengal has been, for the men invariably to travel at night; should, however, they hereafter have to travel occasionally by day, that the arrangement for meals specified in para. 7 of this memorandum will be necessary.

10th. As to the extent of railway carriage accommodation allowed, it has always been arranged that six soldiers with rifles take the place of eight ordinary passengers, and four the place of six.

11th. The railway authorities now agree that if Government will sanction troops proceeding by *third* class carriages (closed in with venetians), they (the railway officials) will give up one such carriage for only half the number of ordinary passengers for which it is calculated; and if the above is agreed to, they will also agree to give up second class carriages for 32 instead of 40 men as at present.

12th. For a regiment or wing proceeding to embark, invalid carriage accommodation will be provided, according to the actual amount required to provide for all sick men present, and for parties of invalids, according to the indent of the medical officer in charge of the party, specifying the actual number requiring such accommodation, and with a reasonable allowance in addition for contingencies of men falling sick on the journey.

13th. The Government of India asked what number of invalids may be sent at one time by train? The Quartermaster-General (with my concurrence) replied, any number which may be present at any station at one time. Practically, this will be found hardly ever to exceed 300 men—as a rule, very seldom over 200—to which number there can be no objection, except deficiency of resting accommodation at the several halting places. The amount of accommodation available at each halting place will, however, always be borne in mind when the several parties are told off.

14th. That accommodation the Quartermaster-General anticipates (if present recommendations are acted up to) will be sufficient for about 200 invalids. Hitherto we have seldom seen larger parties than 200; and, with a depôt at Jubbulpore, the numbers sent at one time can be always regulated to meet the capabilities of the two halting stations between Jubbulpore and Deoli.

15th. I have seen the proposed plan for invalid carriages, and have

* In par. of my Memo. No. 6, of the 31st May, 1867.

suggested a slight modification in one particular, which, if carried out,* will make the arrangements quite satisfactory. The plans were designed (from descriptions given of the style of carriage wanted) in the locomotive department of the East India Railway.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals, &c.

Note.—From conversations which I have had with Deputy Inspector-General Longmore, C.B., since coming to England, I regret that I did not propose that free communication, by end doors and platforms, should exist between the several invalid carriages, as medical treatment and general administration during the journey would thereby be greatly facilitated.—G. S. B.

* As no doubt it will be, as the Quartermaster-General concurs that the alteration is necessary.

APPENDIX No. XI.

IMPROVEMENTS SUGGESTED IN THE EQUIPMENT OF HER MAJESTY'S BRITISH HOSPITALS IN INDIA.

(Copy.)

No. 240. (Quartermaster-General.)

Medical Department, British Forces, Inspector-General's Office,

Sir, Simla, 11th November, 1867.

In returning the papers a per margin,* and in compliance with the instructions of the Commander-in-Chief in India, as conveyed in your letter, No. 2860, of the 14th of August last, I have the honour to submit the following observations for the consideration of His Excellency :—

2. The scales of hospital equipment, as laid down in Statements A and B, will, in my opinion, be found sufficient for the requirements of the ordinary average rate of sick, while in the enumeration of the several articles composing the scales, there is an evident improvement contemplated in the quality of the hospital clothing and equipment in this country.

3. That such an improvement is essentially necessary, I have not failed to point out in my successive inspection reports, rendered during the last seven years which I have served in Madras and Bengal; and the matter has also been dwelt upon in various other communications which I have had occasion to make, and of which some are enumerated as per margin.†

4. From His Excellency's own observation, and from the prompt action taken thereon at Bareilly in December last, when he inspected the hospital of Her Majesty's 37th Regiment, I feel certain that the Commander-in-Chief is as satisfied as I have long been, that great changes and considerable improvements are called for, not only in the quality of the hospital clothing and equipment in India, but also in the system of supply.

5. As, however, there are in the Lists A and B no proposed scales for use on the line of march or in the field, I will append to this letter what appears to me suitable and sufficient scales for these occasions, as I hope, with the improvement proposed in the quality of the equipment, there will also be a radical change and improvement in the system of supply; and that, under such an improved system, there will be separate scales for cantonment hospitals and for those in the field, or on the march.

6. I am indeed glad to see by Paragraph 4 in Letter No. 109 s., of the 20th of June last, from the Controller-General of Military Expenditure, that such a change is contemplated. That it would be attended by an increased amount of comfort to the sick, as well as by an immense saving in the tear and wear

* Letter No. 67, of 6th August, 1867, from Secretary to Government Military Department to Quartermaster-General; enclosing Memo. No. 109 s, of 20th June, 1867, from Controller-General of Military Expenditure to Government Military Department; and Letter No. 943 c, of 12th December, 1866, from Controller of Military Accounts to Secretary to Government Military Department with Scales A and B of Hospital Equipment for European Troops.

† Letter, Bangalore, 21st August, 1861, from Deputy Inspector-General Dr. G. S. Beatson to Deputy Adjutant-General, Madras; No. $\frac{489}{B.C.}$, of 17th June, 1863, to Quartermaster-General; No. 205, of 15th December, 1863, to Adjutant-General; Inspection Reports on Barracks and Hospitals, 1864 to 1866; No. 89, of 18th April, 1864, to Quartermaster-General; No. 508, of 3rd June, 1865, to President Sanitary Commission for Bengal; No. 355, of 12th January, 1865, to Quartermaster-General; No. 1131 s, of 28th December, 1865, to Officiating Adjutant-General; No. 6 s, of 11th January, 1866, to Adjutant-General; No. 16 s, of 20th Jaunary, 1866, to Adjutant-General, No. 38 s, of 15th February, 1866, to Adjutant-General; No. 97, of 23rd May, 1866, to Adjutant-General.

of equipment, and therefore of expense. I feel quite certain; while, on the other hand, I look upon any material improvement in barrack or hospital bedding and equipment in this country as incompatible with, if not almost impossible under, the present system of supply,—a system which contemplates the existing scales and arrangements as ones to meet, not only the requirements of ordinary times and circumstances, but also the exigencies of the line of march or of active operations in the field.

7. That the existing system has, as a rule, met the requirements of the line of march and of field service, must, I think, be freely conceded; but that it has done so at an enormous and most unnecessary expenditure of transport, must also, I conceive, be admitted; as, under the present arrangement, all the ordinary equipment i, on all occasions when carriage can be procured, carried about on every move of the corps. In fact, it cannot be otherwise, as there is no little difficulty, without a recognized scale for guidance, to determine, on the occasion of it may be) a sudden move, what should be taken and what may safely be left behind. In addition to which, if the decision could be come to, there is no responsible or recognized department to take over what is not required, or at all events, what may be dispensed with in the exigencies of moving service.

8. Again, it seems to me that it may be safely said, that after any rough campaign of any duration, or even after a long ordinary march (unless carts can be used), the greater part of the equipment, whether it had actually been in use or not, would require almost entire renewal, as the exposure to weather, and the daily loading and unloading on and from the transport animals would be sufficient to damage most articles which have been subjected to the exposure and to the above unavoidable process, where pack animals are the means of carriage.

9. Further, on the ordinary line of march, under the present system, regiments are seen moving along with their whole equipments, although probably two-thirds of it may never be required on the march, and although the two corps may be exchanging stations, and might quite well, under a different system, have left much of the equipment behind for the use of the regiment arriving at the station which the other had left.

10. Two years ago, to take but one instance, the 7th Royal Fusiliers and 97th Regiments exchanged stations,—Ferozepore and Saugor,—and each dragged along, during a two and a half months' march, every article of its hospital equipment, much of which might quite well have been left by each corps at its former station for the use of the relieving regiment on its arrival at its new destination.

11. Of course, the alteration in the system which is proposed (and which I have long advocated), -viz., to make all ordinary equipment stationary, and consequently to be handed over to a responsible department on a regiment leaving the station, the corps at the same time receiving in lieu a regulated amount (according to a fixed scale) of marching equipment; and in the same way, the regiment arriving giving over its field equipment, and receiving in return its full cantonment supply,—will necessarily involve the formation of a responsible department, which will be answerable for the receipt, safe keeping, and issue of the whole stock of hospital clothing and equipment.

12 All this, in England and the Colonies, devolves, as regards hospital equipment, on the Purveyor's Department; and as regards barrack equipment, on that of the Barrackmaster. In this country, if the proposal to substitute the Madras Purveyor's system for that of the Steward's system which now exists in Bengal and Bombay, be carried out, as I hope may be the case, the department necessary for the safe custody of hospital stores would be at once in existence.

13. By changing from the Bengal to the Madras system, the charge of the hospital stores would, in this country, virtually devolve on the Commissariat, as in Madras the Purveyor (a native) is the servant of the Commissariat, and over him that department has a hold to the extent of the security which he is required to furnish before he is allowed to enter on the duties of Purveyor.

14. In the relation which the Purveyor under the Madras system bears to the Commissariat, there is a considerable difference to that which the two departments bear to each other in the British Service; but so far as regards

India, I think the Madras arrangement is best suited to meet all requirements.

15. As I have before remarked, when on several previous occasions the question of the comparative advantages of Purveyors *versus* Stewards has been referred to me, I have no hesitation whatever in expressing my opinion in favour of the former,—a preference grounded on actual experience of the Madras system, both in quarters and in the field, the latter experience having extended over a period of nearly two years, while Surgeon of one of Her Majesty's regiments on the Madras establishment throughout the last war in Pegu.

16. During that period, the 51st Light Infantry, of which I was then the Surgeon, was constantly associated with other British regiments on the *Bengal* establishment. There were, therefore, means of comparison; and I could never see any one advantage in having a Medical Subordinate thrown away in the performance of duties to perform which required no professional knowledge whatever. This was not my opinion only, it was that which I believe was arrived at by the Superintending Surgeon of the Force, a *Bengal* officer, Dr. Forsyth, afterwards the Director-General of the Bengal Medical Department, who, if I am rightly informed, was one of the first, after his return from Pegu, to advocate the substitution of Purveyors for Stewards.

17. The great supposed advantage,—at least the one which I have heard advanced in favour of the Steward system,—is, that thereby a spare Medical Subordinate is at hand to fall back upon in case of need. In a recent communication, as per margin,* I have said, and I have no hesitation in repeating the expression of that opinion, that the above-assigned reason for having a Medical Subordinate in the position of Steward, is about the very strongest reason which presents itself to me *against* the practice.

18. The reasons why I think so are given fully in the communication above referred to, and they are,—

Firstly—That the presence of a Medical Subordinate in the performance of non-professional duties may be, and is not unlikely to be made, an excuse for giving to regiments an insufficient establishment of Medical Subordinates for the performance of the professional duties which properly belong to this class of officers.

Secondly—It is an useless waste of trained labour to place a man in a non-professional position at the very time of his service when he is most likely to be really useful in a professional capacity. By withdrawing him from professional duty at such a time, he is not unlikely to lose much of his professional knowledge and aptitude, and consequently he becomes but a broken reed to lean upon in case of sudden emergency.

Thirdly—I believe the employment of Medical Subordinates as Stewards is morally injurious to the department, inasmuch as most of the irregularities which I have known brought against members of the Subordinate Medical Department have been in connection with their duties as Stewards.

Fourthly—The idea that a man who has the responsible duty of charge of stores allotted to him, is still to be available on any emergency for other and totally different duty, seems to me an erroneous one. The former duty is quite enough to fully occupy the time and attention of one man; and if his time and attention are to be diverted at any time to other duties, such diversion may not unreasonably be advanced as an excuse for his being forced to neglect to a certain extent the primary duty imposed upon him.

Fifthly—The charge and issue of stores, whether hospital stores or any other, does not require that the individual entrusted with such charge should possess any professional knowledge whatever. No Purveyor in the British service is supposed to have any such knowledge, and it is not desirable he should have it, for he is much better without it; as, if he were a Medical Man as well as a Purveyor, he might set up his own opinion and judgment as to whether he should or should not meet the requirements of the Medical Officer. This he is not allowed to do; he may draw the attention afterwards of higher authority to any expenditure which seems

* No. $\frac{58}{A.G.}$, of 4th May, 1867, to Adjutant-General (copy attached).

excessive, and higher medical authority may require full explanation from the Medical Officer under whose directions the expenditure was incurred; but the first duty of the Purveyor is to meet the requirements of the Medical Officer for the wants of the sick.

19. But to return from this digression. The arrangement which the new system of supply, if introduced, will require, will simply be, that at each station there be a Resident Purveyor in charge of all the hospital equipment which will be needed for use in quarters, or in the field, or on the line of march. From this supply the Station Purveyor would, on the arrival of a corps at the station, hand over to the Regimental Hospital Purveyor a sufficient quantity (according to a fixed scale) of 10 or 12 per cent., according to the rate of hospital accommodation allowed for the particular station. On receiving this supply for use in quarters, the Regimental Purveyor would account for, and hand over to the Station Purveyor the marching or field equipment which he had drawn on leaving the last station where the corps was quartered. In the same way, a regiment leaving a station would give over its ordinary equipment, and receive that for the march, or for the field in lieu.

20. The scale of marching* equipment might, I think, be safely fixed at five or, at most, six per cent. of strength; that for the field at double those rates, or rather, in all cases, at 12 per cent. In Table A is an enumeration of the articles which should, in my opinion, constitute the field and marching equipment, which, I think, should be identical, except in amount, that for the field being at least double the quantities allowed for use on an ordinary march.

21. There seems to me to be now little more to say, except to make a few remarks on some of the more important articles of hospital furniture and equipment; and we will first notice the subject of hospital bedsteads.

22. With regard to these, I have referred to all the Administrative Medical Officers of the British Service in this Presidency, and to the Inspectors-General of Hospitals, British Service in Madras and Bombay, and I find there is not the slightest difference of opinion in favour of iron bedsteads, nor as to the necessity of doing away entirely with the use of wooden cots in every British hospital in India; already it would seem, from the report of the Inspector-General of Hospitals in Bombay, that, in that Presidency, iron bedsteads are almost universal.

23. As to shape, &c.. it is generally considered that an iron frame of the same shape as, but of course thinner, than the present wooden charpoy frame, and with a thin plate iron head-piece, of just sufficient breadth to keep the pillows in their place, would answer very well, if bottomed with broad white tape. Some officers, however—indeed, a good many—object with reason to tape bottoms, inasmuch as they harbour vermin, and to undo the tape is a very tedious process.

24. This latter objection, of course, can be overcome by having a certain number of spare cots, as there almost always will be, and by having two or three undone every day, which can easily be managed in an Indian hospital where there are always spare coolies, not on duty, but available for any legitimate hospital work.

25. There is, however, the valid objection to tape bottoms for hospital beds (although, barring this objection, probably none else are so comfortable), and that is, that they undoubtedly harbour bugs. I would, therefore, decidedly prefer (as suggested by Deputy-Inspector General Innes, C.B.), a bottom of strong wire netting in an iron frame-work, which latter could rest on a ledge on the inside of the bed-frame, and be easily fastened with a lashing of thin cord, although even this lashing would scarcely be required if the frame of the bottom fitted and rested well on the ledge of the frame-work of the bedstead.

26. I need scarcely say that all iron bedsteads (bottom and all if of iron bands, or strong wire netting) should be galvanized or dropped into molten zinc, by which means all crevices are filled up, and the surface can be made smooth and polished.

* Except for a long march, no part, or very little of which would be performed by rail, I think 5 per cent. would be found ample.—G. S. B.

27. From the report of Deputy Inspector-General Dr. Gordon, C.B., it appears that there is a cot already invented by Colonel Broome, and known as "Broome's Cot," which the Sanitary Commission for Bengal (of which Dr. Gordon was a member) thought most highly of—in fact, considered as the best style of hospital cot which they had seen, and which they consequently strongly recommended to be tried. I have not myself seen this cot, but hope to do so when I am again in Calcutta; meantime, from the very favourable report of its construction, and of its suitability as a hospital bedstead, I think it should have a full trial.

28. If, however, after such trial, it be adopted for general use, the iron should be galvanized, as painting is but an insufficient substitute from the damage it undergoes in the ordinary process of cleaning, and from the every-day wear and tear inseparable from barrack and hospital furniture. Another objection to paint for iron cots is, that it (the paint) often blisters and rises, thus affording shelter for bugs.

29. *Mattresses.*—In the annexed scales (A and B), horsehair mattresses are provided for; these are undoubtedly the best; although, therefore, I have before mentioned coir as a good substitute for hair—in fact, taking it all in all, the best substitute I know—I have no hesitation in pronouncing in favour of hair, if the great additional expense which this material, properly prepared, will cost in this country be not considered an insuperable objection.

30. In addition to the ordinary mattresses, there should be always ready, and at hand, a good supply of palliasse slips, to be loosely stuffed with sunn (Indian hemp), or coir, or, if neither of these substances is at hand (as might occur in the field or on the line of march) then with clean dry straw, for cases of contagious disease. These palliasse cases and their contents to be, of course, destroyed when the special occasions for their use are over.

31. If straw, however, be used, especially in cases of cholera, a blanket should be spread over the palliasse and under the sheet, so as to prevent any undue or rapid abstraction of heat from the patient; for straw is a cold substance. This blanket should of course be burned with the rest of the bedding.

32. Hair bolsters and pillows are also provided for in the proposed scales; nothing, therefore, need be said further on this head.

33. *Blankets.*—English blankets are also specified, and thus a requirement of great importance, and one which has been often pressed upon notice, will at length be supplied and met.

34. *Counterpanes.*—The Scale says "white tufted": as such are unobjectionable, in fact perhaps the best, no remark is required. I have, however, on previous occasions, mentioned coloured woollen rugs, or woollen and cotton o the texture of a light blanket, thinking that during the hot weather in the plains, especially in Lower Bengal, such a coverlid over the top sheet would be all that a man would require, and be as much as he could bear over him, even towards morning; but the white-tufted coverlid will do just as well, and, with the sheet, will be generally enough in the hot weather at most plain stations.

35. *Sheets and Pillow-Cases.*—The Scale recommends that these shall be of the strongest unbleached cotton cloth. This is what I have frequently recommended, as the material now in use is of the thinnest and most inferior description. The proportion of articles of this description should be ample, to admit of their being changed at least once a-week, and as much oftener as the Medical Officer may, in special cases, deem necessary. It seems to me that the numbers allowed in the proposed scale will fully suffice to meet the above requirements, and still leave a reasonable surplus for contingencies.

36. *Hospital Clothing.*—This has hitherto been very insufficient in quality; and the fact having attracted the attention of the Commander-in-Chief,* on the occasion of inspecting the hospital of Her Majesty's 37th Regiment in December last, when, on a cold winter morning in Rohilcund, the patients out of bed were shivering in thin chintz gowns, I again, by the desire of his Excellency,

* As it had often before attracted mine, causing many representations to have been made by me without any result.—G. S. B.

brought the subject (on this occasion directly*) to the notice of the Government of India. The result has been that the Government, without hesitation (pending the introduction of the new Scale of equipment), has sanctioned that the hospital gowns for winter use, in all hospitals above Allahabad, shall be lined with country blanket, and be issued so lined before the commencement of this present cold season. The evil noticed by the Commander-in-Chief, and so often previously pointed out by myself, has thus, I trust, been obviated for the future.

37. The new Scale provides for two kinds of hospital clothing: one of thick, warm material; and one of thinner texture. This arrangement of having different qualities of hospital clothing is *most* necessary in a country where men, during the winter, are in the snows of the Himalayas, subjected to the extreme cold of Peshawur, or to the very mild *coolness* of Calcutta and Lower Bengal; to say nothing of the purely tropical winter of Southern India.

38. The former, viz., the warmer clothing, should be of the same material (and in this opinion all the officers I have referred to agree with me) as that in use in England, and in most of our Colonies; but I think the colour might be improved, and be either a *fast* grey, or, as in the Naval hospitals, a dark blue. The present bluish grey, which is the colour in use in British Military hospitals, fades and becomes shabby in appearance before it is so in reality. As to the material for the lighter description of clothing, I am induced to think that it also should be merely a *lighter* description of woollen material; for, as remarked by Deputy Inspector-General C. A. Gordon, C.B., who, as a member of the late Sanitary Commission for Bengal, has fully studied this subject,—"It seems to me," says Dr. Gordon, "that the thinner description of "woollen material will serve all useful purposes. During the very hot season, "comfort and convenience are both best consulted by permitting patients to "be without any other dress than a pair of loose trousers and a shirt;† and "when, for the sake of appearance, a gown is put on—as, for instance, during "the hour of visit, or when patients are allowed to walk outside—the thin "woollen material can be borne without inconvenience."

39. A great revolution of opinion has taken place on the subject of dress since I first served in the tropics. Twenty years ago, almost every one wore cotton clothing during a great part of the year; now-a-days, light woollen material has greatly superseded the use of cotton, and I believe the change has been beneficial to health, especially in localities where the heat is damp and muggy.

40. There are, however, exceptional stations at which, for a few months, the dry heat is very great. At such places, cotton gowns might be in store, as, with the hospital equipment stationary, the keeping such in store would be attended with but little expense and no inconvenience. In a country where the extremes of climate meet, as they do in so many parts of this side of India, some variety in clothing and equipment is absolutely unavoidable.

41. On the line of march, which will almost always be in the cold season, and in the field, there should be nothing but woollen clothing (but not English broadcloth) either for the sick or for men in health. I understand that the 60th Rifles wore woollen clothing (serge) throughout the whole siege of Delhi, and were about the healthiest regiment in the force.

42. Probably no material will be found better adapted for hospital clothing in this country than the blue serge so much in use in the Royal Navy on all tropical stations. This material can be got of thick and thin qualities, and while strong and durable, is at the same time not oppressively warm, as it is of open texture. It may indeed be considered whether, at a large number of stations, one quality of serge would not suffice, by having the gowns for winter (and for hill stations at all seasons) warmly lined; the others quite *un*lined.

* When my former representations were made I was not in direct communication with the Government of India; the Inspector-General of Her Majesty's Hospitals being then an officer of the Army Head Quarters Staff. Under the reorganization of the Medical Departments in India, the Indian Medical Department ceased to have anything whatever to say to British hospitals: the administration of these —financial and general—being vested solely in the head of the British Medical Department under the orders of the Governor-General of India in Council.—G. S. B.

† Practically it naturally comes to this in very hot weather.—G. S. B.

43. Trousers should be of two kinds: one warm woollen, and the other cotton of good strong quality, and of some suitable fast colour.

44. Drawers will also be essential at many stations during the winter months, and are therefore very properly provided for in the scale of equipment now proposed.

45. I will now add that the table utensils, plates, bowls, drinking mugs, salt cellars, &c., should, in cantonment hospitals, be all of plain white crockery; and in the field, or on the line of march, of strong tin, or of what is preferable, strong enamelled iron. The knives and forks should be of good strong quality, and if the handles are of white metal, so much the better, as being more durable than those of horn. The spoons should be of white iron well tinned.

46. Dr. Gordon has suggested whether, as regards hospital equipment for the march, it may not be advisable to take into account how much of the journey is to be performed by ordinary march, and how much by rail; in order to consider the advantages of carrying with the regiment or detachment the whole of the marching equipment, or of having halting places at definite distances along the line, and at the termini of railways, where all the necessary requirements of troops *en route* could be supplied.

47. It seems to me that, as the hospital equipment for the march will be compact and light, and only at the rate of five per cent., there will be less risk of confusion, especially when the march neither begins nor terminates by rail (which must still, for years to come, be very frequently the case in India) if the regulated scale of equipment is supplied at starting, carried with the troops along any portion of their journey which is performed by rail, and given over on arrival at their destination, when their marching hospital equipment would be replaced by that sanctioned for use in hospitals in cantonments.*

48. With reference to this latter, I may merely observe further, that in the accompanying scales, drawn up by the Examiner of Medical and Controller of Military Accounts, but based on the recommendations of the Sanitary Commission for Bengal, there appears to be the same percentage of blankets for all hospitals. With a stationary supply of hospital equipment for cantonments, and separate scales for the march, and for service in the field, I think the allowance of blankets may, and should be, regulated by the circumstances of locality and of climate. In the coldest weather, for instance, in Lower Bengal, and in Southern India, one good English blanket and a counterpane and sheet will be sufficient. In the North-Western Provinces again, for many months in the year, and in hospitals in the hills, at almost any season, a second blanket will be needed, while in the more northern parts of the Punjaub, and at hill stations, in the winter, at least three English blankets and counterpane will be essential to the comforts of weakly men in hospital.

49. I have indicated in Table B what it seems to me will be suitable scales of barrack bedding in cantonments, on the line of march, and in the field, as doubtless the question of bedding for men in health will follow the consideration and settlement of that for men in hospital.

50. I may now add, that I regret that upwards of two months have elapsed since the receipt of the Quartermaster-General's letter, to which this is in reply; but I must plead in excuse for this delay, a very heavy amount of current work in my office, taking up almost the whole of my time during every day; and also the fact, that before giving a final opinion on the important subject now under consideration, I was anxious to communicate with, and receive replies from, experienced Medical Officers in various parts of India.

51. These replies have been received, and in all essential points, I think I may say that they coincide with those views which I have myself arrived at, after giving for years a good deal of consideration to the subject.

52. I may lastly observe, that I consider it will be highly expedient, that whatever decision the Government of India arrive at, be made applicable to all the Presidencies; as, under the new arrangements for embarking and disembarking all troops proceeding to England, and all arriving in this country

* It might, however, be considered whether Dr. Gordon's suggestions could not be adopted as regards dhoolies, which are cumbrous to carry by rail.—G. S. B.

at Bombay, it has become necessary to move British regiments from one Presidency to another under the orders of the Commander-in-Chief in India; in fact, as regards the British force in this country, all distinctions of Presidencies are at an end.

53. I will now simply refer to Tables A, B, C, and D.

In Table A is indicated the equipment which it is considered will meet all essential requirements for hospitals on the line of march, and in the field.

In Table B, the bedding which it is considered will suffice for the health and comfort of duty men in cantonments, on the march, and in the field.

In Table C, are scales of equipment for all female hospitals in cantonments. These requirements for female hospitals have been brought to my notice by Deputy Inspector-General Dr. C. A. Gordon, C.B., and it appears were recommended for favourable consideration as far back as 1858, by a Committee specially appointed in Calcutta at that date, to consider the whole question of hospital equipment. No results whatever seem to have followed on the recommendations then made.

In Table D, are enumerated a few articles omitted in the proposed scale (apparently from oversight), but which Dr. Gordon has brought to notice as important requirements.

TABLE A.

PROPOSED Scale of Marching and Field Hospital Equipment; the former at the rate of five per cent., and in special cases and circumstances at six per cent. of strength. The latter at the rate of 12 per cent. of strength:—

	In the Field, for for every 100 men of strength.	For a strength of of 800 men, the ordinary strength of a Regiment of British Infantry.
Dhoolies, all of one shape and size, the Bengal pattern preferred	12	96
Mattresses, either of coir or horsehair, made to fit the dhooly	12	96
Pillows, large, of coir or hair..	12	96
Ditto, of different sizes and shapes, and some of soft cotton, for extra use and to serve as cushions for very weakly or wounded men	6	48
English blankets (grey or brown, for the field and march)	24	192
Sheets	48	384
Pillow-cases	24	192
Warm woollen (serge) hospital gowns ..	12	96
Ditto trousers	12	96
Cotton shirts	24	192
Woollen socks	24	192
Waterproof sheets	4	32

Of the above articles of equipment, the only one which some perhaps may think might be dispensed with in *moving field* hospitals, is the article of sheets, which perhaps cannot be considered absolutely necessary, although undoubtedly tending to the comfort and cleanliness of the patients' beds.

2. In field hospitals in the rear, establishments which are, as a rule, much more stationary, and which must be formed (if the force is at all large) to supplement the moving regimental hospitals, bed sheets should undoubtedly form part of the equipment. Indeed, in the more stationary field hospitals in the rear, unless the force is moving forward rapidly, and the hospital establishments have to advance too, the equipment might be in several respects more liberal than it can ever be in field regimental hospitals, which have to

advance with the fighting force. Even in these latter, however, I think bed-sheets might in all ordinary circumstances be provided in sufficient numbers to admit of at least one sheet per bed (of course, to be regularly changed), so that the patients might generally have a sheet under, even although they had none over them.

3. It may perhaps be supposed that the existence of more stationary field hospitals may render unnecessary so large a proportion of hospital equipment for regimental ones, as 12 per cent., an amount which under the present cumbrous system, it has often, on active service, been found a most difficult matter to find carriage for. But the difficulty of transport will be greatly diminished under the more compact arrangement for field hospital equipment which is now proposed. For instance, the mattresses (a very bulky article) will only be in the same proportion as are the dhoolies, and will, in fact, form part of the furniture of the dhooly; and if these latter had broad-tape bottoms, instead of string ones, as at present, it may be well considered whether a thick woollen numbda, the size and shape of the dhooly, might not be substituted for mattresses to the extent of, say 60 per cent.

It is also to be considered in fixing the amount of equipment for regimental field hospitals, that men who have become ineffective for service at the front, and are in consequence transferred to the hospitals in the rear, have to be provided with bedding and clothing while in transit, and that there should always be at the front some available surplus, to meet the sudden requirements that on active service may at any time be looked for.

With the smooth even surface of a broad-tape bottom in the dhoolie, a numbda, say an inch thick, would have all the comfort, and all the warmth of a mattress, without the weight and bulk of the latter. Cork beds might also be substituted for a proportion of mattresses, especially if the number of dhoolies be diminished by the introduction of other means of transport, to wit, wheel vehicles. That some change of this kind is inevitable cannot be doubted, for the strongest of all reasons, viz., that dhoolies are useless without bearers, and that this class of servants are rapidly disappearing in almost every part of the country, and will continue to disappear wherever railroads, or even carriage roads exist; for long before railroads were in operation, dâk gharries had driven the dhooly-bearers almost off the Grand Trunk road from Calcutta to Umballo.

This question of wheeled ambulance is, I am aware, now engaging the attention of the Quartermaster-General; for, under the existing, and still altering circumstances of transport in this country, it is one that must be very soon decided upon. In the meantime, by a recent arrangement, each dhooly has a dandy attached to it, by which means the available transport is greatly increased, as the two spare dhooly-bearers (allowed to every dhooly) can on an emergency carry a sick or wounded man in the dandy, and that, too, from positions, and over ground, which the more cumbrous dhooly is not so well suited to traverse.

With regard to the shape and size of dhoolies, I think, all agree that the Bengal dhooly is the best. Some Medical Officers think that it might be made lighter and smaller at the top; but it is to be remembered that a dhooly has rough work and usage to go through, and that any diminution of the top will proportionally diminish the breathing space when the curtains are closed, a consideration not to be overlooked.

Table B.

Proposed scale of bedding for men in barracks, and for healthy men on the line of march, and in the field.

Barrack Scale—per man: one cot, boards and tressels (three boards and iron tressels) as already sanctioned. Military Department letter to Quartermaster-General, No. 146, Simla, 10th August, 1867.

One mattress, Coir or Sunn; Coir decidedly recommended at all places where the material can be obtained; at present, a mattress forms no part of the soldier's bedding in India, its place being, it is supposed, supplied by a wadded cotton rezai. I consider a mattress essential, especially with boards and tressels; for, although I consider this form of cot by far the best for general use in barracks in this country, still the softest plank is too hard for

comfortable repose without an intervening cushion. A coir pillow, as long as the mattress is broad, and sufficiently thick to raise a man's head comfortably high.

Blankets, English, according to climate and season. For instance:—

	Winter.	Summer.
In the Hills	2	1
In the Northern parts of the Punjaub*	2	1
In North-west Provinces, Rohilcund, Oude, and lower parts of Punjaub	1	..
In Lower Bengal	1	..

A good woollen rug of the warmth of a medium English blanket, and of a neat coloured pattern. This, it is considered, will, with sheets, be quite covering enough in the summer months from Lahore to Calcutta.

A pair of sheets and pillow-case, of good strong unbleached cotton for each bed. These articles to be regularly changed by the Barrack Department, with which department the washing of such articles should rest; and from which department clean ones should be regularly issued, and the soiled ones taken away on a specified day once a-week, or at most once in ten days; this point might be left to the Station Board of Health, with the restriction that these articles need not be changed oftener than once a-week.

The articles, therefore, recommended to form the bedding of every man in barracks are—

1 cot.
1 mattress.
1 pillow.
1 rug, woollen, coloured.
Blankets (English), according to climate and season.
1 pillow-case.
1 pair sheets.

These articles should appertain and belong to the barrack, not to the individual using them, and would therefore be accounted for to the Barrack Department on the corps leaving, and received over from that department by the relieving corps on arrival.

The bedding should be aired daily before being made up, and after having been so aired, should be rolled up and secured by a broad leather strap, and placed at the head of the cot, as is seen in every well-arranged barrack in England and the British Colonies. The boards of the cot should be scrubbed at least once a fortnight.

Bedding for healthy men in the field and on the line of march.

This should consist of clean dry straw, as now sanctioned.

A strong suttringee,† at least 6 feet long, I would say, 6 feet 2 inches, and 3 feet 2 inches wide.‡

Two English blankets, grey or brown, will be better than white for the field.

These articles, with the man's great coat, seem to be all that are essential or expedient to carry with men on the march, or on service; they were allowed to the British portion of the force in Bhootan, and I believe were considered sufficient. It would, however, be well to devise some means of protecting the soldier's bedding from wet on service, and on the march. This is not easily done in the hotter parts of India, where all waterproof cloth is so liable to rapid destruction. Dr. Munro, C.B., mentions that this object was in a great measure secured in the 93rd Highlanders by the use of strong

* Say in the Peshawur Division. For four months however, the blankets will not be required even in this division.—G. S. B.

† This is a strong cotton rug, much used in India.—G. S. B.

‡ A coir pillow should have been also specified.—G. S. B.

straw mats, every man having one to wrap his bedding in on the march, and to place under it in the tent.

This would be an inexpensive, and Dr. Munro says, was a very effectual means of keeping the men's bedding clean and dry.

TABLE C.

In the following lists are the articles of equipment (as already mentioned) which are considered necessary for female hospitals in cantonments only.

For 20 women.

20 bedsteads, same as for men.
20 mattresses, „
40 pillows, „
20 rugs.
20 English blankets.
40 pairs of sheets.
80 pillow-cases.
80 shifts.
80 flannel under-shifts.
40 petticoats.
40 calico petticoats.
40 calico short gowns.
40 long warm gowns.
60 caps.
60 pairs of worsted stockings.
60 „ of cotton „
30 „ of slippers.
60 hand towels.
20 jack towels.

For 15 Children, from 1 to 4 years of age.

60 small shirts, of two sizes, 30 each.
60 „ flannel, „
60 pairs of drawers, „
60 frocks.
60 caps.
20 beds.
20 mattresses.
20 pillows.
40 pairs of sheets.
40 „ of pillow-cases.
20 blankets.
60 pairs of stockings, half warm and half cotton.

For 15 Children, from 1 to 10 years of age.

20 beds.
20 mattresses.
20 pillows.
20 blankets.
40 sheets.
40 pillow-cases.
45 pairs flannel drawers, of three sizes.
45 „ cotton „ „
45 „ warm stockings, „
45 „ cotton „ „
30 caps.
30 cotton rugs.

I would add a remark to the effect that a liberal allowance of soap ought to be granted for use by women and children, as well as for the men; that the large number of beds above noted are rendered necessary for the accommodation of the mothers of children, who in many instances have to come to hospital with the latter to attend upon them. That the lists given do not include the equipment for kitchen, lavatory, outhouses, or matron's quarters, and that the clothing for sick women and children ought to be under the charge of the matron.

TABLE D.

The following articles have been noticed by Dr. Gordon, C.B., as useful additions to the scale proposed by the Sanitary Commission for Bengal, and adopted as the basis of the scale proposed by the Controller of Military Accounts:—

200 bedside rugs (for a hospital of 100 beds); the omission of these articles is clearly an oversight, as they have long been allowed in hospitals in India, and where the floors are of chauam, they are essential to the comfort of sick men.

I may, however, remark that those allowed under present regulations are much too small; each rug should be 6 feet by 3 feet, and should be of a neat pattern, and of good strong quality; they might be manufactured according to a fixed pattern in any of the first-class jails in this country; those for the Punjaub in the Anarkullie jail where the work turned out is admirable.

Waterproof sheets, say half a dozen to a regimental hospital; two air beds (with bellows for inflating them).

2 air pillows, round.
1 „ square

I think, as those articles require great care to keep them in order in this country, they might be kept in the station store, and issued on special requisition when required for use in a regimental hospital.

A door mat for each door of the hospital.

This, of course, is necessary, and must have been omitted by an oversight.

1 Ice chest, properly fitted.

2 Ice blankets.

Undoubtedly very useful, and necessary for hospitals in the plains of India.

Soap ought to be allowed, as it is in all hospitals out of India, in the proportion of one lb. for every 100 diets.

I will only add that, whatever form of bedstead is decided upon, there ought to be in every hospital, say 5 per cent. of beds with smooth *unyielding* bottoms; wooden ones of transverse boards will probably answer best for cases of fractured limbs, or for other injuries which require the limb to be kept steady on an even flat surface.

(Signed) G. S. BEATSON, M.D.,
Inspector-General of Hospitals,
and P. M. O. British Troops in India.

Medical Department British Forces, Inspector-General's Office.

MEMORANDUM. Simla, 4th May, 1867.

In reference to Memo. 3544 of 23rd ultimo from Adjutant-General, and in compliance with the instructions therein conveyed, I have the honour to forward the accompanying letters conveying the opinions of the several Medical Officers referred to, on the subject of the comparative advantages of the Bengal system of hospital stewards, and the Madras system of hospital purveyors.

2. The opinions are not unanimous, and of those officers who have had experience of both systems, four are in favour of the Madras one, four of the Bengal, and two doubtful.

3. In the communication as per margin, I advocated that the Madras system was superior to that in force in Bengal, and recommended its introduction into this Presidency; I have still no hesitation in stating my belief that the Madras system is the best (although in one respect it needs still to be modified), and that the employment, as in Bengal, of a Medical Subordinate to perform duties which require no professional knowledge whatever, is simply an useless waste of all the training required in an officer of the Subordinate Medical Department.

4. All the qualifications that are needed to enable any man to perform

* Memorandum, No. 48 S., of 11th February, 1865, to Adjutant-General.

the duties of a hospital purveyor in any service are honesty, and that amount of education which enables an individual to keep accounts of the hospital equipment, handed over to him, and of the expenditure of medical stores and comforts in his charge. That an individual, with the above qualifications merely, can efficiently perform the duties of purveyor, is witnessed in the Madras Presidency every day.

5. On this subject (as before stated in my Memo. above referred to) I am not speaking without some practical knowledge, having served as Surgeon of one of Her Majesty's regiments on the Madras establishment; and having, during my service on that establishment, gone through the last Burmese war, from its commencement till its close, during the whole of which period, about 15 months, I can confidently assert that the hospital under my charge was always quite as well supplied as was that of either of the other two British regiments (18th and 80th) which were serving with the 51st, but were both on the Bengal establishment.

6. One reason which I understand is advanced, and urged by Inspector-General Dr. Arnott (the only member of the Committee which sat last year in Calcutta who is anxious to uphold the steward system)* as a very strong one, in favour of having a Medical Subordinate as steward (in other words, as a purveyor) is that thereby there is an extra Medical Subordinate to fall back upon in case of emergency. This fact is to my mind the very strongest reason against the Bengal and Bombay systems.

7. The duty of looking after, and seeing duly provided, supplies for the sick in a hospital, is of quite sufficient importance and magnitude to fully engage the attention of one officer; and if the officer to whom such duty directly appertains is to be, or can be, called away to other work, the sick must of necessity suffer; while the idea of having this individual in reserve is considered as some justification for keeping up a very scanty, if not insufficient, staff of Medical Subordinates.

8. In addition to this, the practice is unfair to the subordinate medical officer employed as steward. For years that individual may have done no professional duty whatever; and considering that much of the professional knowledge of this class is practical, it cannot be expected that after years of non-experience, such an officer can either willingly or efficiently take to professional work. I say willingly, for I cannot understand a man taking willingly to any work for which he feels he is not really competent; especially when it is a duty in the discharge of which mistakes may involve the most serious results.

9. Experience, at the very commencement of the Eastern Campaign, forced on the authorities at the War Office, the conviction that the time and attention of Medical Officers must not be taken up and engrossed with anxiety as to the supply of bodily sustenance for the sick and wounded in their charge; and that to relieve them of all such duties, and to enable them to devote all their energies to the far higher ones for which their professional education had been specially acquired, it was necessary to re-establish a Purveyor's Department on the same footing as had before existed during the Peninsular War, but which had almost entirely disappeared during the long interval of peace, during the latter part of which period Medical Officers had—from a most mistaken economy—to do purveyor's duties in addition to their own, rendering quarterly an account of their stewardship, and having their time often occupied for days or weeks, in accounting for some pence and farthings in error in the hospital account.

10. Thanks to the clear judgment of the late Lord Herbert, all this is now at an end; and the Medical Officer in the British Army is a professional man and nothing more, or rather nothing less, it being the duty of a separate *non*-professional department to supply, without any order from the Medical Officer, all equipment, diet, &c., according to a prescribed scale; and to supply, besides, whatever the Medical Officer deems necessary for the sick, his (the Medical Officer's) requisition being ths Purveyor's voucher.

11. This system is *very nearly* approached by the Madras one, and to the

* I have not seen Dr. Arnott's Memo., I may not be therefore quite correct as to the purport of his remarks. I am writing from information casually obtained. —G.S.B.

latter I consider we should come in Bengal. I have seen (but some time since, so I may make some mistake) the opinions for and against the Madras system expressed by Heads of Departments in this Presidency. In the first place, I believe I am correct in stating that the propriety of the change was first mooted by Dr. Forsyth, when Director-General of the *Bengal* Medical Department. This Officer, as Superintending Surgeon during the latter part of the second year's occupation of Pegu, saw both systems in operation, and came to the conclusion that the Madras one was the best.

12. I believe the present Controller-General of Military Expenditure is also in favour of the change; and I think I may add, so also is the Controller of Military Accounts.

13. The chief opponent of the change, if I rightly recollect, was the Commissary-General in Bengal, some few years back; his reasons for continuing the present system being, in my opinion, neither valid nor tenable. He argued that if the change took place, and an approach to the British purveying system was introduced, the Commissariat would lose hold of the Surgeon's responsibility. So they would, and so most certainly should they lose possession of any such hold over the Surgeon, who has far higher duties to attend to than looking after sheets and mattresses. The charge and the supply of these is the legitimate duty of a Purveying Department, whether (as in the British Service) that Department is a distinct one, or (as by the Madras system) a branch of the Commissariat, which Department should bear all its own legitimate responsibilities, and should look to its own agents, and not to the Surgeon, for the due care of supplies committed to their charge; the Surgeon's duty being merely to see that the Purveying Department does its duty, and that it has at all times in good condition, and in sufficient quantities, all that the sick require.

14. The Madras system is therefore only *an approach* to that in use in the British Service, inasmuch as a certain amount of responsibility still attaches in Madras to the Surgeon, in the matter of the equipment furnished for the use of his hospital; the Commissariat, instead of looking after their own agent, having managed to fix this portion of their legitimate duty and responsibility on the Medical Officer. This should be changed; and with such a change introduced, the Madras system is one which is right in principle, and may be, as it has been, perfectly efficient in practice.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals,
and P. M. O. British Forces in India.

APPENDIX No. XII.

CONSTITUTION OF ARMY HOSPITAL CORPS (NATIVE) FOR SERVICE IN HER MAJESTY'S BRITISH HOSPITALS IN INDIA.

1. The men to be enlisted and to be subject to Military Law.*

2. To be selected from Mahommedans and from the Kahar and Chumar Castes, and to be not under 18 years of age, nor above 28 years on enlistment.

3. The latter restriction as to age might be advantageously overlooked on the first formation of the corps, when it will be advisable to secure the services of really good men who have been employed for continuous periods as hospital attendants, and in such cases the men engaging might be allowed to count, at all events, a portion of their past services towards pension.

4. No man in the corps should be considered eligible for promotion to the higher non-commissioned ranks, unless he is able to read and write in his own language; and in the case of compounders and head dressers, it should be considered a recommendation that the individuals should be able to read and write English also.

5. The general discipline of the men of the corps who are attached to regiments to be enforced by the Officer Commanding and the Medical Officer in charge; all minor offences to be dealt with directly by the latter, who should have the power of enforcing small fines in the way of punishment. A defaulters' book to be kept in the hospital, in which all such fines are to be entered. This book to be at all times open for the inspection of the Officer Commanding, and for that of the Inspecting Medical Officer of the district. All serious offences to be dealt with by the Commanding Officer, in accordance with the Articles of War for Native Regiments.

6. The head-quarters of the corps should be at a General Hospital, and if such an institution should hereafter be established at any large military station in the Upper Provinces, such a locality would be more central, and in every respect more desirable than Calcutta.

7. A Military Officer would, it is presumed, be appointed to command the corps; if so, such officer should be responsible for the careful keeping up of the men's records, and under the instructions of the Principal Medical Officer British troops in the Command, for the general distribution of the men, so that the requirements of the several hospitals might be duly met.

8. A training establishment to be kept up for compounders and dressers at the General Hospital where the head-quarters of the corps are located in each Presidency. These classes to enter the corps in the capacity of orderlies, with the highest rates of pay granted to this grade; and when their training has been completed, to be detailed off to regiments from time to time.

9. The men of the corps to wear a suitable plain uniform,‡ non-commissioned officers being distinguished by the usual distinctive badges.

10. Each non-commissioned officer and orderly to have, when no longer fit for service, a pension according to a scale corresponding to their daily pay,

* The ranks of the corps should include—

1. As sergeants or havildars:—head compounders, assistant ditto, head dressers, clothiers, head cooks, head dhobees, head tailors.
2. As corporals or naicks:—sirdar ward coolies, assistant dressers, tailors, assistant head cooks, sirdar Bheesties, barbers.
3. As orderlies:—shop coolies, ward coolies, ordinary cooks,† Bheesties, dhobees, stewards' servants, assistant tailors.

† To be employed where the head cook requires a second to assist him. The assistant head cooks will be for battery and other detachment hospitals.

‡ Blue serge with grey facings, like Army Hospital Corps at home.

with the addition of any good conduct pay which they may have been drawing at the time of their discharge.

11. All promotions from one grade to another in the corps to be made by the Officer Commanding, according to the reports received quarterly from the Medical Officers under whom the men have been serving; such promotions being in the first instance submitted to, and approved of, by the Principal Medical Officer British troops in the Presidency.

12. Bheesties need not necessarily be included in the enrolled men of the corps, as this class of hospital servants requires no special training; there is, however, no objection to their being so included; indeed, the reverse, for in any circumstances, when a man of this class has served long and faithfully as a hospital servant, such service should secure to him some consideration in the way of pension, when he has become incapacitated for further work.

13. Mehters should not be included in the ranks of the corps. These men require no training, and the presence of so low a caste in the ranks of the corps would tend to lower its prestige in the eyes of those classes of men which it is desirable to attract to it, and for whose special training and advantage, as well as in the interests of the sick, the establishment of it is intended.

14. It is not desirable to include *barrack* cooks* in the ranks of the corps, as it should be considered—like the Army Hospital Corps in the British Service—as constituted for *hospital* requirements only.

15. The men of the corps serving with regiments might draw their pay—monthly, of course—on pay bills countersigned by the Surgeon, through the Regimental Paymaster, by whom the hospital attendants are now paid. The pay lists would be made out by the steward, if that grade of subordinate Medical Officer is continued; if it is done away with, by the native purveyor, who would take the steward's place.

16. The hospital serjeant, who should invariably have a steady private, a lance corporal of the regiment, to assist him in all matters of hospital discipline and supervision of the hospital servants, as well as to aid in the preparation of returns; should make up monthly an extract from the defaulters' book, for transmission to the head-quarters of the corps, and for entry in the general defaulters' book, in which each man on the strength of the corps would have a sheet. In this way the character and conduct of every man of the corps would be known to the Officer in Command, to whom reference should invariably be made before the issue of good conduct pay to any man; as from the continuous record of each man's service in his possession, he would at once be able to see whether or not the man was entitled to the extra pay asked for, and which would, of course, be liable to forfeiture for misconduct, as is the case with every other soldier.

17. The hospital serjeant would be required (weekly) also to see the men's kits, and to report any deficiencies.

18. Although it is proposed to give the non-commissioned officers and orderlies of the corps certain military rank and position, it will require to be clearly understood and defined that such non-commissioned rank is to carry no authority or command, save over the men of the corps itself, in the performance of their hospital duties; and that in every matter of military discipline and subordination, the regimental hospital serjeant will have superior authority, and will be not only, as he is at present, responsible for the discipline of the hospital generally, but also for that of all the native attendants employed in the service of the sick.

19. As the strength of the corps will be kept up only to that standard which will meet all the probable ordinary requirements of the average number of daily sick, with a reasonable reserve of trained men to meet casualties and to replace men who are sick, it will of course be necessary, when owing to any increase of sickness in any particular hospital, more attendants are required, for the Deputy Inspector-General of the Circle to sanction the employment of whatever additional aid he thinks may be needed to meet such increased requirements, such extra servants being of course discharged when the necessity for their employment has ceased.

20. The employment of these extra men would of course be temporary, but

* A suggestion to this effect was made by the military authorities.

good conduct and intelligence while so employed might be considered as a claim for future permanent employment in the corps when vacancies occurred.

21. Before, however, employing any temporary hired hospital servants to assist the permanent establishment of any particular hospital, the Deputy Inspector-General would, as a matter of course, satisfy himself that there were no available men in any other hospital near at hand, in which there was a less amount of sickness; and, therefore, it might be, some hospital attendants to spare for the time being.

22. It would be highly advantageous to have in the corps the present fixed establishment of Dhoolie bearers, viz., two mates and six bearers per regiment, as is now allowed in quarters. These eight men, steady, trained, and trustworthy, would form a valuable nucleus when, on the march or in the field, the establishment has to be suddenly increased to five and 10 per cent. of Dhoolies to strength. Every day this valuable class of hospital servants is becoming more scarce, and therefore the presence of a few steady, well-trained men would be no small advantage.

23. The non-commissioned officer and men of the corps would of course be provided with suitable quarters near the hospital, and the hospital serjeant would be responsible that order and regularity were maintained in quarters, as well as when the men were on duty in the hospital, and also that such quarters and their vicinity were always kept clean.

24. In consideration of these extra duties, and of the fact that hospital serjeants are in a much less advantageous position as regards pay and allowances in India than that which they occupy in England and the Colonies, an allowance of 15 rupees per month (in addition to present pay as hospital serjeant) might be granted. If this sum were allowed, the hospital serjeant would be as well off, but not better, than he is everywhere out of India.

25. The lance corporal, whom it is recommended should be attached to each British Regimental Hospital, in aid of the hospital serjeant, might also do the work of hospital writer, and for this duty receive the present sanctioned allowance of 10 rupees per mensem.

26. On the line of march, as at present sanctioned for hospital servants, the men of the Hospital Corps should receive one rupee batta per month, in addition to their ordinary and good conduct pay; and, as is now the case at stations where provisions are high, the usual arrangement of giving compensation allowance should be continued.

27. The uniform to be supplied annually by Government, to consist of one plain serviceable jacket, with other suitable articles of native dress. The jackets of non-commissioned officers to be distinguished by chevrons of white tape, or of grey cloth, the colour of the proposed facings, edged with white cord; and the men to be required to retain the jacket issued the year immediately preceding, to serve for fatigue purposes.

28. No arms need be supplied to, or worn by, the men of the Hospital Corps.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals, &c.

Class 1, ranking as Havildar.

	Present Pay.	Proposed Pay.
	Rupees.	Rupees.
Head Compounder*	10	10
Assistant Compounder	8	8
Head Dresser	8	8
Clothier	8	8
Head Cook	6	8
Head Dhobee	6	8

* As Senior Havildar.

CLASS 2, RANKING AS NAICKS.

	Present Pay.	Proposed Pay.
	Rupees.	Rupees.
Sirdar Ward Coolie	6	6
Assistant Dresser	6	6
Tailor	7	7
Assistant Head Cook*	6	6
Sirdar Bheestie, if it is decided to include this class ..	6	6
Barber	6	6
CLASS 3.—NATIVE ORDERLIES.		
Shop Coolies	5	5
Ward Coolies	4	5
Ordinary Cook	5	5
Bheesties	5	5
Dhobees	5	5
Stewards' Servants	6	6
Assistant Tailor	6	6

* For detached hospitals in which there would be no Head Cook.

In addition to proposed pay, good conduct pay to be issued to deserving men after every five years' service at the rate of 8 annas a month for Havildars and 4 annas a month for Naicks and Orderlies.

PROPOSED ESTABLISHMENT (NATIVE) ARMY HOSPITAL CORPS PER REGIMENT.

Infantry Regiment.

1st Class Non-Commissioned Officers as Havildars (6):—
- Head Compounder as Senior Havildar.
- Assistant Compounder.
- Head Dresser.
- Head Cook.
- Head Dhobie.
- Clothier.

2nd Class Non-Commissioned Officers as Naicks (5 + 2 = 7):—
- Tailor.
- Sirdar Ward Coolie.
- Assistant Dresser.
- Sirdar Bheesty.
- Barber.
- (2) Mate Dhooly Bearers.

3rd Class Orderlies as Privates (24):—
- 2 Shop Coolies.
- 2 Ordinary Cooks.
- 2 Bheesties.
- 2 Dhobies.
- 1 Assistant Tailor.
- 9 Ward Coolies.
- 6 Dhoolie Bearers.

Total, 37.

Being calculated for, say, 5 per cent. of sick to strength of 800.

Cavalry Regiment.

1st Class (5) :—
1 Head Compounder.
1 Head Dresser.
1 Head Cook.
1 Head Dhobie.
1 Clothier.

2nd Class (6) :—
1 Sirdar Ward Coolie.
1 Assistant Dresser.
1 Sirdar Bheestie.
1 Barber.
2 Dhoolie Mate Bearers.

3rd Class (19) :—
2 Shop Coolies.
1 Ordinary Cook.
2 Bheesties.
1 Dhobie.
1 Steward's Servant.
1 Assistant Tailor.
5 Ward Coolies.
6 Dhoolie Bearers.

Total, 30.

Royal Artillery (Head-Quarters of a Brigade).

1st Class (5) :—
Head Compounder.
Head Dresser.
Head Cook.
Head Dhobie.
Clothier.

Field Battery (Hospital).

2nd Class (7) :—
1 Assistant Compounder.
1 Assistant Dresser.
1 Sirdar Ward Coolie.
1 Sirdar Bheesty.
1 Mate Dhoolie Bearer.
1 Tailor (to act also as Clothier).
1 Assistant Head Cook.

3rd Class (9) :—
1 Shop Coolie.
1 Bheestie.
1 Dhobie.
3 Ward Coolies.
3 Dhoolie Bearers.

Total, 16 for a Battery.

It is calculated, as each battery present with brigade head-quarters will thus be complete in hospital servants, that only first class servants (five) in addition will be required at a brigade hospital of Royal Artillery.

Convalescent Depôt Hospitals.

The same establishment to be allowed as for an Infantry regiment, during the period when the depôt is fully occupied with such extra ward coolies as the rate of sick may require.

During the winter months, the depôt hospital establishment might be utilised for regiments marching, and for drafts of invalids proceeding from the several stations in the circle towards a port of embarkation ; and again in the spring, for attendance on parties of sick and convalescents proceeding to the several hill depôts.

The following Table will show about the probable strength of corps which will be required to meet the requirements of all the British hospitals in the Presidency of Fort William, calculated according to the scale shown for each individual portion of each arm of the service.

British Infantry.—33 Regiments.

33 × 6	198	men of the 1st Class.
33 × 7	231	„ 2nd „
33 × 24	792	„ 3rd „
	1,221	Total for Infantry.

British Cavalry, 7 Regiments

7 × 5	35	men of the 1st Class.
7 × 6	42	„ 2nd „
7 × 19	133	„ 3rd „
	210	Total for Cavalry.

Royal Artillery.—Head-Quarters of Brigades (8).

8 × 5 40 men of the 1st Class

Horse and Field Batteries (35).

35 × 7	245	men of the 2nd Class.
35 × 9	315	„ 3rd „
	600	Total for Royal Artillery.

Convalescent Depôts (9).

9 × 6	54	men of the 1st Class.
9 × 7	63	„ 2nd „
9 × 24	216	„ 3rd „
	333	Total for Convalescent Depôts.

Grand Total.

Of the 1st Class	327
„ 2nd „	581
„ 3rd „	1,456
Reserve of all classes to meet emergencies, say	136
	2,500

Two thousand five hundred men for attendance on the sick may, at first sight, appear a very large number, and it may seem that great expense must necessarily be involved in the establishment of such a corps; but it must be borne in mind that it is not the establishment of any new, but the modification and improvement of an already existing and most essential institution which is being recommended; and that the above number, large though it may seem, is actually far below the present entertained numbers of untrained men who are borne on the establishment of British hospitals in this country; and moreover, that such establishments, in some form or other, must be maintained even if they were far more expensive than they are, or than they need be under the improved re-organization now proposed.

Garrison batteries of Artillery have not been included, as, except in special circumstances, those batteries have no medical or hospital establishment allowed.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals,
and P. M. O. British Troops in India.

APPENDIX No. XIII.

FEMALE NURSING IN, AND NURSES FOR, MILITARY HOSPITALS IN INDIA.

Army Head-Quarters, Camp, 20th December, 1866.

In returning the documents as per margin,* relative to the introduction of female nurses into the European Military Hospitals (General) in this country, I have the honour to observe that I have nothing to add (as regards the duties of nurses) to the remarks contained in my memorandum to Adjutant-General, of the 16th of March, 1865, a copy of which is appended to these papers.

2. With reference, however, to some of the other points dwelt on in the memorandum of Captain Williams, Royal Engineers, member of the late Sanitary Commission for Bengal, I would remark that I fully concur in the opinion of Miss Nightingale, as quoted by Captain Williams, that the practical introduction of the scheme into this country should not be on too large a scale, but rather, in the first instance, be regarded as a tentative measure, confined to one good General Hospital (when such exists in India), under the most favourable circumstances attainable.

3. That if the system is to be inaugurated under favourable circumstances and conditions, it seems necessary to have in the first instance, as suggested by Miss Nightingale, a thoroughly trained Matron, with a Staff of three or four nurses from England, to train the raw material procurable in India. When such a commencement is made, it will be more easily ascertained whether or not the future supply of nurses could be obtained in this country "from the "widows of deceased non-commissioned officers, soldiers, and railway employés, "and from the increasing class of domestic servants."

4. That the wives of non-commissioned officers and soldiers in the service would supply the required number of trained nurses for *regimental female* hospitals, might, I think, be safely calculated on; as one thoroughly trained nurse in a regiment could undertake the preliminary instruction of one or two others. In this way could be tested the special qualifications and aptitude of candidates, the best of whom could be subsequently sent to the recognised training school for the purpose of having their training thoroughly completed. With this class of nurses, viz., those for regimental *female* hospitals, a practical course of training in midwifery would be a most important point, as attendance on such cases would constitute no small portion of their duties.

5. As regards the supply of nurses for the more general duties of the larger hospitals, it is believed that the widows of the classes above alluded to might be found sufficient to supply the numbers required, as there is not likely to be a large field for their services in this country, as long as there exist very good reasons for, as a rule, adhering to the system of regimental hospitals instead of

* Adjutant-General's Memorandum No. 44c, dated Head-Quarters, Camp Agra, 20th November, 1866 (Hospitals—Nurses), to the Inspector-General, Her Majesty's Hospitals, forwarding for opinion—

Military Department Memorandum No. 24, dated 2nd November, 1866, to the A. G., with enclosures.

Letter No. 456, dated Simla, 29th August, 1866, from Sanitary Commissioner, Bengal, to Secretary to Government of India, Military Department.

Captain Williams' Memorandum on Female Nursing in Military Hospitals in India, with Appendices:—

I. Miss Nightingale's suggestions on a system of nursing for Hospitals in India.
II. Draft rules for regulating the duties.
III. Letter to Secretary to Principal Inspector-General, Medical Department, No. 774, dated 23rd December, 1864.
IV. Memorandum by Inspector-General Her Majesty's Hospitals, dated Calcutta, 16th March, 1865.

introducing general military ones. At present there cannot be said to be one general military hospital in the country, as the General Hospital in Calcutta is quite as much Civil as Military.

6. Independent, however, of the great facilities for re-marriage, which every respectable widow of the above classes has in India, the question of supply (quality as well as quantity) can only be tested by actual experience; while, quite apart from its solution, I am disposed to agree with Miss Nightingale, that an occasional supply of fresh blood, and of advanced knowledge in all that applies to the duties of nurses, will be of great advantage, and can only be secured by obtaining from time to time small drafts of recruits from England.

7. Another point strongly dwelt upon by Miss Nightingale is the very, in fact the most, important one, of the control and discipline of nurses in general military hospitals in India. In my former memorandum* of the 16th of March, 1865, I expressed an opinion that the nurses in hospitals in this country should be under the orders and control of the Medical Officer in charge of the hospital; and in the present existing circumstances of this country, I am inclined still to adhere to that opinion, from the belief, as expressed by Surgeon-Major Beatson, whose experience of the practical working of nurses and nursing in the late General Hospital at Allahabad entitles his opinion to great consideration, that it is doubtful whether we can always command in hospitals in India a Superintendent of Nurses who will have sufficient influence and control over the ordinary nurses to be able to inflict even minor punishments without remonstrance. When a complete organization is introduced in this country as in England, with a Superintendent-General of Nurses at the head of it, the circumstances will be different, and every Medical Officer would then be only too glad to leave all matters of discipline in the hands of the above-named functionary and her lady superintendents.

8. There cannot possibly be any more unpleasant duty imposed on a Medical Officer than that of the control and discipline of, and, if necessary, the infliction of even such minor punishment as the deprivation of beer, on a female nurse; and, therefore, as soon as all control can be vested, without any sacrifice of efficiency or risk of squabbling and remonstrance, in one of their own sex, so much the more pleasant for the Medical Officer, and so much the more satisfactory for the nurses themselves; for, as Miss Nightingale very justly remarks, "in disciplinary matters a woman only can understand a woman."

9. That discipline can be maintained effectually, and at the same time with the exercise of every kindness and consideration, will be acknowledged by every one who had an opportunity of witnessing the working of female nursing in the hospitals on the Bosphorus and in the Crimea. Indeed, all who had experience of those hospitals will not hesitate to admit, that but for the presence of the lady superintendents and lady nurses, the introduction of female nurses into military hospitals would have been a failure, instead of, as it proved to be, a great success.

10. With reference to the recommendation, or anyhow the expressed hope, that the details of management and supervision of the nurses should remain, in no small degree, in the hands of the Ladies' Committee in Calcutta, I may remark that although I am quite convinced that the lady members of that Committee are the real friends, and would be the anxious guardians, of "a body "of women who are often friendless enough in this country," and while I would gladly see every effort made by those ladies to infuse a religious tone into the nurses' minds, care must be taken against vesting in an irresponsible body any authority in a matter of military hospital organization.

11. There is at present a General Hospital at Calcutta, in which sick merchant sailors and other non-military classes are received, and in which there is also limited accommodation for a small number of European and Eurasian female patients. In this hospital, however, there are no sick British soldiers treated; those sick in Calcutta and neighbourhood being treated either in the hospital of the regiment stationed in Fort William, or in the Depôt Hospital at Chinsurah, where the Invalid Depôt Establishment is located.

12. The Calcutta Hospital, however, such as it is, seems to be the only field at present existing for the training of nurses, and for the supply of these to the

* To the Adjutant-General.

several depôt hospitals which exist in this Presidency.* It is intended that each of these hill depôts shall eventually have accommodation for 500 sickly men and convalescents: therefore, considering the average state of health of the men sent up to them annually, we may estimate that there will be an average of about 70 to 80 sick in hospital from April till end of October, a number which would require one matron and four nurses: so that, including the requirements of Chinsurah, a total of about seven matrons and twenty-eight nurses would be the number which would be needed for the seven depôt hospitals, a number which comprises all that for the present will be required for military hospitals in this country, as I presume it is not intended to introduce them into regimental ones; while for the female hospitals of regiments, the wife of a soldier of the corps seems to be the proper person to be secured as a nurse, as she would be with her husband and at her home, and ready to go with the regiment on a change of station without inconvenience.

13. I must not omit to remark that, as the institution of nurses should not, in my opinion, be extended to regimental hospitals, and as female nurses could never accompany a moving army in the field, the introduction of a certain number into general military hospitals must not be permitted to supersede, in the least degree, the subordinate medical establishment; nor to interfere with any plan for improving the organization and training of the native male attendants—a subject on which I hope to submit a report very shortly, recommending that an attempt be made to assimilate their organization to that of the Army Hospital Corps of the British Army.

14. In conclusion I may remark, that however advisable it may be in England to introduce, as far as practicable, the principle of general hospitals instead of regimental ones, there are difficulties in the way of any great extension of the principle in India, although it will be a necessity to have one on a largish scale, in which to train the men of the Native Hospital Corps, if its establishment is sanctioned; and considering its central position, its good climate, its large garrison including all arms, and the comparative compactness of the cantonment, I consider Meerut† the place best adapted for such a hospital.

15. I am aware that for such a hospital it has been advocated that Calcutta is the best place. I cannot see this. At Calcutta the force is very small, and never likely to be much increased; the climate is bad, or anyhow is disliked by all up-country natives; its position is the reverse of central; while the argument that its having a medical school is an advantage not to be overlooked, does not seem to me to hold good in the matter of training hospital attendants, although it may do so in the case of medical subordinates; but for the clinical instruction of this class there exists the Medical College and Medical College Hospital. After having passed through these, they can learn their practical training as subordinates in any regimental hospital to which they may be attached.

(Signed) G. S. Beatson, M.D.,
Inspector-General of Hospitals,
and P. M. O. British Troops in India.

* Depôts:—Chinsurah, Darjeeling, Nynee Tal, Landour, Murree, Kussowlie, and Dalhousie.

When Pokri Depôt is ready, Landour will be done away with.

† The Commander-in-Chief thinks Allahabad a preferable locality to Meerut for a military general hospital. I fixed in my own mind on Meerut, on account of the larger permanent force stationed there. There are, however, very good reasons to be urged in favour of Allahabad, and some of these His Excellency has stated in Adjutant-General's letter No. 132c, dated Head-Quarters, Calcutta, 29th February, 1867.

With regard, however, to the relative healthiness of Allahabad and Meerut, I cannot think that the former has any advantage over the latter, in fact I think the advantage is, without doubt, on the side of Meerut; and that this will show even more when the present crowded state of the barrack bungalows is diminished by the removal of every alternate bungalow.

If, however, for the reasons adduced by His Excellency, Allahabad be selected as the place for the Military General Hospital, there are no good grounds for objection on account of the health statistics of the station; indeed, I anticipate that when the new barracks and cantonment are occupied, Allahabad will not be unhealthy.—G. S. B.

APPENDIX No. XIV.

ON PHYSICAL INDICATIONS OF AGE FROM SEVENTEEN TO TWENTY-FIVE YEARS, &c.

[The Medical Officers appointed to examine recruits having been called upon to record their opinion as to the probable age of men offering to enlist, Dr. Aitken, Professor of Pathology at Netley, has, at the Director-General's request, favoured him with the following observations on the subject].

By *practice* and *special study* of the subject I believe that a Medical Officer could determine, with reasonable exactness within a year, the real age of a recruit from 17 or 18 to 23 or 25 years of age. But the Medical Officer must have sufficient time to make and record the observations on which his opinion would be based.

The subject must be regarded from three points of view—

1. The recognition of eligible young lads, say from 17 to 20 years of age.
2. The recognition of eligible young men from 20 to 25 years of age.
3. The recognition of older men, say from 27 to 30 and upwards, who make themselves up to look younger than they really are, and among whom the majority of the objectionable characters referred to are known to exist.

It is only by a careful comparison of many physical indications that any reasonable conclusion (as distinguished from a guess) can be arrived at respecting age, as there is *no single indication* that can be depended on to denote the real age.

A detail of the physical indications best calculated to guide the Medical Officer in forming an opinion on the age of recruits embraces an examination of the following points for comparison :—

(1.) The *form* of the features in connection with the growth of the permanent teeth and of the upper and lower jaw.

A characteristic elongation of the face and upper jaw commences about 17 or 18 years of age, and goes on to 25, connected especially with the development of the hindermost molar teeth ; and when it is complete the anterior margin of the ramus of the lower jaw is placed at nearly a right angle to the alveolar border. The angle of the jaw (which is the meeting of the posterior border of the ramus with the base) is then about 120°, and in men of powerful physical development is sometimes not more than 110° or 112°.

Previous to the age of 17 years there is not sufficient room in the alveolar arch for the growing sacs of the permanent molars.

At and after 17 years of age the alveolar border becomes deep and broad, and continues to get deeper and broader at the hinder part as the wisdom teeth grow. This growth and enlargement of the jaw is for the accommodation of the permanent molar teeth.

At 17 years of age the wisdom teeth of the *upper jaw* lie in the maxillary tuberosity behind and above the second molars ; in the *lower jaw* the wisdom teeth are embedded in the base of the coronoid process. The wisdom teeth afterwards descend, and successively assume their ultimate proper position as the jaw elongates. When the elongation of the jaw is complete, its arch-curve becomes semi-elliptical.

The development and appearance of the teeth are very rarely in advance of age, and the wisdom teeth, as with the other teeth, are developed and completed first in the lower and afterwards in the upper jaw. On the other hand, the eruption of the wisdom teeth in some men never takes place, and when there is such arrest of development, the other points suggestive of age must be all the more carefully inquired into.

The elongation of the face and jaws is complete when the wisdom teeth are fully exposed and in position, about 25 years of age.

The progressive growth and change in position of the teeth and of the form

of the jaw thus furnish a valuable guide in estimating ages between 17 and 25 years.

(2.) The evidences of attrition from use in mastication, *in each separate class of teeth*, must be the subject of special examination. This examination must also take into account the nature of the food on which the man seeking to enlist has been fed. In the north of Scotland, where young men feed largely on hard oatmeal cakes, or in the case of sea-faring men fed on hard biscuits, the grinding teeth will be greatly more worn to a level on the surface of their crowns than the teeth of men fed on softer food, such as a man who had been some years in the Army, and who was trying to re-enlist, would have been fed upon.

(3.) The external signs of puberty and comparative age of the beard furnish also some grounds for an opinion; also the texture of the skin and its smoothness, or freedom from wrinkles in certain parts, such as external angles of the eyes and edges of the muscles of expression of the face. The downy chin of 17 to 20 contrasts with the beard of older men, and repeated shaving of the beard discloses the cut surfaces of aged and mature hair.

(4.) The gait of youth, and the tractile force of muscle from 17 to 20 years of age is markedly different from that of the man of mature growth, in consequence of the relative dimensions of limbs to trunk of body, and of the pelvis having undergone changes. These dimensions ought to be the subject of accurate measurement and comparison on the plan afterwards described.

From 20 to 25 years of age the bones become thicker, the joints stronger, the shoulders broader, the muscles firmer, and better developed. The gait of the man thus becomes firmer than that of the youth; and the tractile force of the muscles of men from 20 to 25 years of age gives from 366 to 413 lbs., and is greater than the force of youth's from 17 to 20 years, in whom the tractile force is generally under 366 lbs., presuming that the individual has not been trained in this trial of strength, or has not worked at a trade which would be equivalent to such training.

(5.) The concurrence of height, relative dimensions of individual parts, and development of the body generally, must be the subject of special examination.

The very extensive measurements of the human body recorded by the late Dr. F. P. Liharzik, of Vienna, and published by the Imperial Royal Court and State Printing Office of the Austrian Government, furnish the best basis for comparing the "law of increase" in the relative growth of different parts of the body as an indication of age.

Dr. Liharzik's results from 18 to 25 years of age represent a gradual and normal increase in relation with "*six fundamental dimensions*," so that the nearer the different parts of the body correspond with these dimensions the more regular is the growth of the body in accordance with age. Moreover, marked deviations from these normal dimensions, especially as showing retarded growth of the chest at particular ages, are of practical value as indicating a tendency to scrofulosis with or without tubercle.

The following are the six fundamental dimensions upon which an estimation of the stature of man in relation to age is based, being portions of its total length at various ages:—

1. The length of the head from its vertex to the apex of the chin, the man lying in the horizontal position and naked.
2. The length of the neck from the apex of the chin to the upper margin of the sternum.
3. The length of the sternum from its upper margin to the end of the xiphoid cartilage.
4. The distance of the xiphoid cartilage to the upper margin of the pubic symphysis, the navel dividing this distance into two equal parts.
5. The total length of the thigh and the leg.
6. The vertical elevation of the centre of the internal malleolus over the sole of the foot.

With these six fundamental dimensions the girth of the body at various parts and the horizontal dimensions at other parts are to be compared, in order to determine whether or not the individual presents those several proportions which are consistent with age and development.

The model height of a growing lad at 18 years of age is 163 centimetres,

i.e., equal to 64·17 inches; while the height of a man who has completed his growth at 25 years of age is 175 centimetres, *i.e.*, equal to 68·89 inches. Of course many exceptions occur, but then the correlation of other dimensions must be in accordance.

The following Table represents in numbers of centimetres the relative augmentations of increase at the ages from the completed 18th year to the completed 24th year, arranged in the following columns:—

I. Age at the end of the year stated.
II. Length of the neck.*
III. Length of the head.
IV. Length of the sternum.
V. Distance between xiphoid cartilage and pubic symphysis. The navel ought to mark exactly the middle point of this line.
VI. The total length of the thigh and leg, measured from the horizontal level of the pubic symphysis vertically to the centre of the internal malleolus. The articulation of the knee ought to mark the division of this line into two equal parts; and thus the thigh from the hip-joint to the knee ought to be equal to the length of the leg from the knee to the internal malleolus.
VII. The distance from the sole of the foot to the centre of malleolus.

(These complete the six fundamental dimensions, to be first determined.)

VIII. Upper length of the body from the vertex of the head to the upper margin of the pubic symphysis.
IX. Lower length of the body from the upper margin of the pubic symphysis to the sole of the foot.
X. Total length from the vertex to the sole.

(The upper extremities being extended horizontally, the following measurements are then to be made.)

XI. Length of the clavicle. It ought to be equal in length to the open hand.
XII. Length of the fore-arm, from the middle of the elbow-joint to the carpal joint.
XIII. Length of the upper arm.
XIV. Distance of the head of the humerus from the middle line of the body.
XV. Half the length of the body. The distance between the tips of the middle finger of the one side to that of the other (the arms being extended horizontally), ought to be exactly equal to the length of the whole body.
XVI. The half-breadth of the shoulders. It ought to be equal to the half-breadth of the hips, and to 1-10th of the length of the body.
XVII. The transverse diameter of the head.
XVIII. Antero-posterior diameter of the head.
XIX. Circumference of head (above the superciliary ridges).
XX. Girth of the chest immediately above both nipples.
XXI. Diameter of thorax. It ought to be equal to the diameter of pelvis.

* See paragraphs 1 to 6 above for the definite points to measure from.

RELATIVE increase of different dimensions in the Growth of Man from the ages of 18 to 25 years.

(FRANCIS LEHAERIK, M.D.)

(Unit of Measure = One Centimetre.)

I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.
Age to the completion of the year.	Length of the			Distance between xiphoid cartilage and pubic symphysis. The navel marks the middle distance.	Total length of thigh and leg.	Distance from sole of foot to centre of inner malleolus.	Distance from vertex of head to upper margin of pubic symphysis.	Distance from upper margin of pubic symphysis to sole of foot.	Total length from vertex of head to sole of foot.	Upper extremities being extended horizontally, length			From middle line of body to head of humerus.	Half length of body to be noted here.	Half the breadth of the shoulders.	Transverse diameter of head.	Antero-posterior diameter of head.	Circumference of head.	Girth of Chest.	Diameter of Thorax.
										Of clavicle.	Of fore arm.	Of upper arm.								
18	7	23	21	12 + 12	82	6	75	88	163	19¼	22¼	29½	10	81½	16¼	16½	19	54	78	21
19	7½	23½	21½	12½ + 12½	82½	6½	76	89	165	19½	22½	29½	10½	82½	16½	16½	19½	54½	81½	21½
20	7½	23½	21½	12½ + 12½	83	7	77	90	167	20	23½	30½	10½	83½	16½	16½	19½	55	85	22
21	8	23½	21½	12½ + 12½	83½	7½	78	91	169	20½	23½	30½	10½	84½	16¾	17	20	55½	88½	22½
22	8½	23½	21½	12½ + 12½	84	8	79	92	171	20½	23½	30½	10½	85½	17¼	17½	20½	56	92	23
23	8½	23½	21½	12½ + 12½	84½	8½	80	93	173	20½	24½	31½	10½	86½	17½	17½	20½	56½	95½	23½
24	9	24	22	13 + 13	85	9	81	94	175	21	24½	31½	10½	87½	17½	17½	21	57	99	24

All the measurements must be taken while the naked body of the recruit is stretched at rest on a horizontal solid plane surface (not a bed), and measurement by centimetres is by far the most useful for comparison. No recruit or soldier ever ought to be measured in the erect attitude. Men are able to raise or lower their stature to an appreciable extent when erect, but not in the horizontal position.

There ought also to be the means within reach of giving a recruit or asoldier a hot bath, with proper supervision that the bath is efficiently performed. It may be necessary, by means of a hot bath, to do away with any enamel or artificial colour applied to the skin of the face to subdue the evidences of age.

The greater the formality and exhaustiveness with which the details of such physical indications are carried out upon the fixed principles already described, the more is the judgment or conclusion arrived at removed from being a mere guess, and the less likely will the drunkards or bad characters discharged the Service present themselves for the ordeal without detection from some one or other points of investigation. His gait alone in some instances may be sufficient to indicate a drilled soldier.

If pains be taken to ascertain that the relative dimensions of the body (as set forth in the Table), are in accordance with the height, that the growth and form of the face and of the jaws are in accordance with development; that the condition of the jaws conform to the development of the third molars above and below; that all the teeth give the usual indications *in each class* of attrition on the summits of their crowns from use; that the external signs of puberty, and the size of the hairs of the shaven beard, are in accordance, as well as the gait and the tractile muscular force of the individual: then I believe that such a formal and exhaustive method of investigation will embrace a combination of physical indications sufficient to guide Medical Officers in forming an opinion as to the age of a man seeking to enlist. Those who will take the necessary trouble to make the subject a careful study will come to a reasonably sound conclusion as distinguished from a mere guess, and no doubt some Medical Officers will be found more apt than others in acquiring the requisite practical experience in the methods of examination.

Systematic training, and constant practical experience in the details of the examination are necessary, and the several batches of Medical Candidates who come to attend the Army Medical School might be required to practice the methods of examination already indicated as part of their special training at Netley.

There now only remains to be noticed the physical signs of the last epoch of age before mentioned, the recognition of which is perhaps the most important for the public service, namely, the indications of age at and beyond 26 or 27 years.

The characteristic elongation of the face and jaws is complete, and the arch-curve of the jaw semi-elliptical.

The features and expression of the face have become fully unfolded, so as to exhibit all those modifications of character seen in the countenances of mature men; for the habits and occupations of life imprint upon the countenance and the mature frame certain general appearances with which one soon becomes experienced, so as to recognise them.

The skin, particularly of the face, and the hair of the head and beard, are fully developed, and in greatest perfection of growth. The skin is dense and thick, and no longer smooth on the face. Its *rete mucosum* becomes dusky or dark, and the hairs of the head may begin to show single white or grey ones intermingled especially in the temporal regions.

The attrition from use of the crowns of the several sets of teeth is obviously marked. The wisdom teeth, if they exist and are not decayed, ought to be fully exposed and in position. If they have existed, but are no longer obvious, sufficient indications will remain in the breadth and deepness of the alveolar processes above and below.

The external signs of puberty are fully expressed, and the scrotum has become pendulous.

The dimensions of the several parts of the body, and the tractile force of the muscles, are at their maximum.

The muscles of voluntary motion, and especially those of the extremities, are prominently increased in development, and are at their maximum bulk. The chest and parieties of the large cavities are also fully developed.

The height and weight of the man is at the best for active work, and their co-relation as an indication of age is of sufficient importance to make the following Table of use for comparison:—

GROWTH of the Human Body from 18 to 30 years of age, indicated by weight and height; averages taken from 100 observations and upwards at each age. Records taken from observations upon 4,800 Criminals at all ages. ("Statistical Society's Journal," March, 1862, by J. W. Danson.)

	WEIGHT.										HEIGHT.									
Age.	Average.		Maximum.		Minimum.		Maximum over Average.		Minimum under Average.		Maximum over Minimum.		Average.		Maximum.		Minimum.		Maximum over Average.	Minimum under Average.	Maximum over Minimum.
	Stns.	Pds.	Stns.	Pds.	Stns.	Pds.	Stns.	Pds.	Stns.	Pds.	Stns.	Pds.	Ft.	In.	Ft.	In.	Ft.	In.	Inches.	Inches.	Inches.
18	8	10·79	10	13	6	6	2	2·2	2	4·79	4	7	5	4·34	5	11	4	10½	6·66	5·84	12½
19	9	4·11	12	8	7	4	3	3·89	2	0·11	5	4	5	4·94	5	11½	4	11	6·56	5·94	12½
20	9	5·58	12	8	7	13	3	2·42	1	6·58	4	9	5	5·11	5	11	5	1	5·89	4·11	10
21	9	5·02	12	0	7	3	2	9·	2	2·	4	11	5	5·57	5	11¼	5	0½	5·68	5·07	10¾
22	9	12·41	13	2	7	0	3	2·59	2	12·41	6	1	5	6·17	6	1	5	0¼	6·83	5·92	12¾
23	10	2·95	12	12	7	12	2	9·05	2	4·95	5	0	5	6·17	6	1	4	11	6·83	7·17	14
24	10	2·	12	12	7	12	2	10·	2	4·	5	0	5	5·94	6	1	4	9	7·06	8·94	16
25	10	5·65	13	8	8	2	3	2·35	2	3·65	5	6	5	6·30	6	0	4	11	5·77	7·30	13
26	10	1·06	13	8	6	12	3	6·94	3	3·06	6	10	5	6·28	6	1¾	4	9⅛	7·07	8·78	16¼
27	10	4·75	13	10	7	12	3	5·25	2	6·75	5	12	5	6·38	5	11¾	5	1	5·37	5·38	10¾
28	10	2·62	13	2	7	7	2	13·2	2	9·62	5	9	5	6·65	6	1	5	1	6·35	5·65	12
29	10	5·53	13	12	8	4	3	6·47	2	1·53	5	8	5	7·02	6	0½	5	1¼	5·48	5·52	11¼
30	10	1·55	14	1	8	1	3	13·45	2	0·55	6	0	5	6·36	6	1	5	0¾	6·64	5·51	12¼

After 30 years the physical indications of age become so obvious as to require no great experience to recognize them.

The details of the several points mentioned will require to be taken with very great care and accuracy. They ought to be so fully recorded in every particular that the records of any individual should be able to identify him, inasmuch as no two persons are exactly alike in their physical indications of age and defects. I need not add that the aim and objects of the work are so responsible as to justify every care and attention being bestowed upon it.

APPENDIX No. XV.

REPORT ON THE EPIDEMIC OF FEVER IN CAPE TOWN, 1867.

By Staff Surgeon-Major THORNTON.

AN epidemic of fever visited the Cape of Good Hope during the past year (1867), following close on the severe epidemic of "remittent fever" at the Mauritius. It was supposed by some to have been introduced from that island. Many still hold that opinion, but the character of the two epidemics are perfectly distinct, one being of a purely remittent type; whilst, in the Cape, a fever of a continued type has been diffused over the whole colony; its severity and the number of cases being dependent on local causes.

It will be advisable, in the first instance, to trace out the origin, and what were the local conditions, that first tended to develop, and then gave the character to the fever in Cape Town. To do so, we must see what influence locality, the sanitary arrangements, and also the character, habits, and social condition of the inhabitants have had in its accession and progress.

Cape Town is situated on the slope of Table Mountain, which bounds it on three sides. From south-east to west, and on the north, it extends along the shore of Table Bay; it is thus practically, in a *cul de sac*, and during the summer, the higher portions of the town are to a great extent cut off from the full force of the south-east winds, which prevail during the summer months. There is, however, a gap, or "kloof," between the Table Mountain and the Lion's Head, through which the cold winds from the south-west sometimes blow. Situated, however, as the city is, on the face of the hill, with a fall of from 100 to 200 feet, converging to the bay, no city could be better situated for drainage or cleanliness; and the streets running at right angles with each other, and well ventilated, it would be difficult to find one in which the gifts of nature were more favourable, or less made use of. It appears to me that originally, when the population of Cape Town was under 10,000, and its extent very limited, that some attempts at drainage were then made; and although the city has increased to about 30,000 inhabitants, and proportionately in extent, nothing whatever has been considered necessary for the sanitary condition of the place. The great want of water in a climate like South Africa, where droughts are the rule and rains the exception, the formation of reservoirs would be supposed to be the first step; but, with the exception of two small reservoirs (I say *small* advisedly, as they are quite inadequate for the supply of the city), there is no provision for the storage of water.

During the last four years, in my own experience, the supply has been far below the demands of health; and this continues year after year; whilst from the water-shed of Table Mountain millions of gallons of water rush uselessly into the sea. The consequences were long apparent that the day would at length arrive when (from the long-continued saturation of the soil, streets and yards, through the most imperfect drainage and a scanty water supply), fever would be developed on the occurrence of a sufficiently existing cause. The nidus was all ready, the exciting cause or causes were rapidly approaching. Amongst these must be deemed the long-continued drought for three years, the rainfall being much below its average. Trade and agriculture met with severe losses. The consequence was, the cessation of public and private works, extreme and persistent poverty, a state reaching almost to famine, and with it, the moral and physical deterioration of the labouring classes. Thus, we had everything prepared for the reception of fever, but nothing for its repression.

To add to all these evils, the poorer classes lived in the higher portions of the town, generally above, or on the level of, the reservoirs, or where the supply of water was so very scanty as to be only available for drinking or cooking purposes; the houses unventilated, overcrowded, and filthy in the extreme. When all these causes are combined, the wonder is, not that there was fever, but that its ravages were so slight when compared with that of the Mauritius. It was, therefore, scarcely requisite that the pandemic wave of disease was passing across this portion of the globe for its production. That this wave of disease would pass across the Cape about this time was pointed out a few years ago by Inspector-General of Hospitals R. Lawson; and the fever having appeared in so many and distant parts of the colony at this time, tends to prove the correctness of his views on the nature of epidemics.

It will, I fear, be impossible to give (beyond what I have collected from the medical men and others) proper statistics as to the progress of the epidemic, as there were no records until the Government appointed some medical men to look after the fever cases; no register of births or deaths; and it is only very lately that the Reformed Corporation of Cape Town have turned their attention to the subject. However, since the Executive Government had taken the matter in hand, some approximation can be made to the amount of fever that prevailed.

After two doctors (Graffe and Brown) had fallen victims to their duty, in attending the fever cases, and having heard that two other doctors were sick, and others had resigned their districts, I considered it to be my duty to volunteer my services to the Government, and render such aid as lay in my power, more especially to prevent its spreading, and thereby protect the troops from its ravages.

On the 29th October, 1867, I was appointed to, and took charge of, the Fourth Ward. This was very extensive, and too large for one person to properly superintend, as I commenced with 98 cases. On the 2nd November, the city was divided into 12 districts, as shown in the accompanying plan, A. When No. 5 District was given to my charge (my district previously having included Nos. 5, 6, 7, and 8), for a few days in December, the districts were again reduced to 6, when I had charge of Nos. 5 and 6 Districts; but the 6 medical men were re-employed, and resumed their old districts, and this arrangement was continued till the 5th of January, 1868.

In examining the plan B, the places marked "red" are those where fever principally prevailed. The houses are generally small, the rooms overcrowded, —several families in each house—windows, where any, kept constantly shut; no fire-places, as a rule, and no water laid on; small, badly-paved yards, in holes, and full of dirt; the streets, with open paved drains, seldom cleaned, and full of pools of stinking offal and dirt of every description; or where swept, the heaps of dirt left all day exposed to the sun. In one street, in No. 5 District, that was a hotbed of fever, which had an open badly-paved drain. A granite gutter was laid down with the most marked benefit, as, before this was done, out of the 26 houses in the street, there was fever in nine or ten houses at the same time; whilst afterwards it fell down to one or two. Whitewashing was also carried on, but in a most inefficient manner, even so it obliged the people to empty and clean out their rooms for once.

The Malays are, I must say, from their religion, personally clean; and although, as a rule, their rooms are clean, they take not the slightest care in keeping the passages or yards clean, and allow the dirt to accumulate to a disgraceful extent. On the other hand, the Negro and coloured people of various races, are disgustingly dirty both in person and rooms, and with their Christianity, they certainly have not learned either cleanliness or morality. I speak of the district that I have had means of becoming intimately acquainted with. It may be worse or better than the others in every way, but for its extent, there was more fever in it proportionate to the population than in any other of the districts.

Having taken a rapid glance at the state of the city, more especially as to the predisposing causes for the production of an epidemic; they were no doubt sufficient in themselves to do so; but still the question remains, "Was the fever introduced from the Mauritius or not?" or "was it merely that, notwithstanding the coincidence of the Mauritius fever, the already smouldering flame was fanned into action by some other cause?"

Dr. Laing, in charge of the New Somerset (Civil) Hospital, states that—
"Fever is comparatively rare in this country, but during the months of March "and April last we had several cases of Mauritius fever admitted from the brig "'Osborne' and the mail steamer 'Saxon.'

"From one of these fever patients landed from the 'Saxon,' whose husband "and daughter had died of the fever on the passage to this place, one of my "female nurses caught the disease, and with difficulty recovered.

"The first cases of the late epidemic fever were admitted into hospital on "the last of June, and, as you will see by the returns, gradually increased."

The brig "Osborne" arrived on the 18th March, 1867, and the Royal Mail steamer "Saxon" on the 17th of June, 1867. The Somerset Hospital is outside the town, close to the shore on the west side of the town; whilst the first cases of epidemic fever were from the other extremity, or eastern side of the city, from the neighbourhood of Glyn Square were admitted with typhus—a fever of a perfectly distinct type from the cases of the Mauritius fever—which were of the remittent type; in fact, it appears to me that the time for the approach of the pandemic wave had fully arrived, as, it having reached the Mauritius late in 1866, it should arrive in the latitude of the Cape about the June following, where everything was ready for its reception. It would be a most interesting point to trace its appearance at the various towns and villages throughout the colony, where, from natural and other causes, no possible communication can have taken place; but I have not succeeded in obtaining this information, but only the dates when the Contagious Diseases Act of this colony was proclaimed to be in force in the several districts: but this does not give the slightest clue as to when the fever first made its appearance.

C.—Act 1 of 1856 Proclaimed in Force; "Contagious Diseases Act."

Locality.	Date Proclaimed.	Remarks.
	1867.	
Cape Town	12th September	Fever commenced in June 1867.
Simons Town	14th "	Fever commenced about 15th August, 1867.
Cape District	19th "	
Worcester	19th "	
Wyneburg	20th "	
Stellenbosh	20th "	First Case, 9th September, 1867.
Port Elizabeth	26th "	First Case, June 1867.
Utenhaige	26th "	
Picketburg	5th October	
Malmsbury	9th "	
Riversdale	10th "	
Paarl	10th "	
Somerset, East	19th "	
Knysna	30th "	

Population of Cape Town as per Census of 1865.

Europeans	15,118		28,457
Africanders			
Negro	13,339		
Malay			

With reference to this Return, the difficulty in deducing any valuable information from it is manifest; also from the absence of any reliable records. I have therefore to look to the Military Returns as the only correct guide as to the progress of the fever. I find that the first case of fever was on the 4th of January, 1867; a woman and a child on the 5th. I may mention that all the cases of fever in the garrison were "simple continued fever," of greater or less severity. A soldier was attacked on the 12th of January; then between the 19th and 23rd January there were eight cases, *i.e.* six men, one woman, and

one child. After that there were only a few cases, principally children, until the latter end of July; but these returns I shall refer to further on. In this Report (with reference to the garrison), the officers, men, women, and children are included together, for the purpose of a better comparison with the returns connected with the Civil population, in which it is impossible to distinguish between either the sexes or ages. Perhaps it would be more correct, that attention was first directed to its origin in other places. The first case of the epidemic fever in Cape Town was about the 24th of June. At Stellenbosh, which is about 30 miles on the line of railway from Cape Town, the first case occurred on the 9th of September, 1867: a coloured person. This case was distinctly traced to be the effects of contagion, the patient (a woman) having a few days previously gone to Cape Town, and stopped for two days in the house of her friends, where there were fever cases at the time. On her return she had typhus fever; and her friends and neighbours, to the number of 30 cases altogether, had fever—all clearly traceable to this original case. By cleaning out the houses, and other sanitary precautions, the disease was soon checked, and the mortality was slight. Now similar communication may, and probably did, take place between the Paarl, Wynberg, and Cape Town, also between Utenhaige and Port Elizabeth; but there are other places where it is not so easily accounted for, and I have no means of tracing the connection, if any. At least this appears to be certain, that in the long-continued droughts, the poverty and depressed state of the people, the overcrowded hovels and accumulated filth (each in themselves sufficient to produce disease), and like applying a match to a train of gunpowder, it required here the generation of but one case to set the epidemic free, and then its ravages were in an inverse ratio to the energy with which the sanitary measures were grappled.

At Simons Town, the epidemic commenced about the middle of August. I have not been able to fix the exact date. Amongst the civilians there were 288 cases and 20 deaths; connected with the dockyard, 20 Kroomen had fever, and 3 deaths. Besides these, 16 cases of confirmed fever (sailors and military) were admitted into the Royal Naval Hospital there. Included in these, were 3 cases of gunners of the Royal Artillery, who were admitted on the 24th July from the steamer "Orontes," who had arrived from the Mauritius, where they had had repeated attacks of the epidemic remittent at that place. One was suffering from ague, the other two from dysentery—the sequelæ of their previous disease. But to these cases I shall refer further on.

At Port Elizabeth, Dr. Roubridge states that "we have had since about "June last cases of irregular remittent fever. The fever is certainly not con- "tagious, and appears to be, pretty nearly, equally frequent in the high and "the low parts of the town; but is of a more severe type in proportion to the "crowding and want of ventilation among Malays and blacks.

"I have had about a dozen cases of fever from the East in the hospital "and in private practice—mostly from Mauritius, some from Batavia—and can "speak with certainty of its identity with ours; and with equal certainty of "the independent origin of our fever, inasmuch as it made its first appearance "up the country." He had seen cases previously at Graham's Town.

From the many returns collected, I regret that the number of cases and results can be given by weeks only, commencing with the 1st July, 1867, to the 2nd January, 1868, no public records having been kept till about the 20th September.

D.—Return of Cases of Fever in Cape Town during Epidemic.

Districts, &c.	1867.																										1868.	Total.
	July.				August.					September.				October.					November.				December.				Jan.	
	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	
Dr. Roux	...	...	...	...	...	...	...	...	...	...	...	82	79	66	78	69	60	21	11	25	21	21	18	30	7	8	5	601
,, Jackson	...	...	...	...	...	...	...	...	...	...	...	90	78	37	50	72	65	31	70	20	30	41	22	29	16	19	18	688
,, Graffe	...	...	...	...	...	...	...	...	...	...	...	67	62	52	38	31	37	Died 31st October					...	...	...	...	...	277
,, Browne	...	...	...	...	...	...	...	...	...	...	...	82	70	53	45	43	56	Died 2nd November.					...	...	...	...	...	349
,, Herman	...	...	...	...	...	...	...	...	...	...	...	87	40	15	29	...	...	...	7	...	...	...	...	...	...	...	...	275
,, Biccard	...	...	...	...	...	...	...	...	...	...	...	90	...	...	...	...	...	..	10	10	6	3	5	7	3	1	...	135
,, Zeederberg	...	...	...	...	...	...	...	...	...	...	...	...	87	25	51	33	19	35	...	10	18	15	15	16	10	7	5	346
,, Lansberg	...	3	8	6	27	59	53	...	...	...	...	...	...	...	...	...	...	54	33	26	20	24	16	17	7	15	9	377
,, Ross	...	...	...	...	...	...	...	80	98	97	110	...	...	...	13	55	19	24	20	32	41	37	15	22	19	14	10	686
,, Thornton...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34	89	49	52	39	37	41	21	15	14	388
,, Abercrombie, Senior	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	15	22	17	12	9	17	1	1	104
,, Abercrombie, Junior	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13	12	18	12	16	22	4	1	98
,, Fleck	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	6	9	1	1	17	7	3	1	52
,, White	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	12	12	15	9	10	9	4	3	80
,, Chiappini...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	10	12	12	12	9	9	6	3	83
Admitted into Civil Hospital...	5	5	4	8	28	40	24	38	30	43	51	111	85	83	84	98	73	60	76	93	57	49	31	36	31	26	11	1,421
Garrison { Men	1	...	1	4	8	3	4	4	7	6	9	4	3	5	2	3	4	5	8	3	8	3	5	2	5	3	...	110
Garrison { Women	...	...	...	...	3	1	1	...	...	...	2	...	1	1	2	1	1	2	...	2	..	...	...	...	...	...	...	17
Garrison { Children...	2	1	...	1	...	...	...	...	...	...	1	3	...	1	1	3	1	1	2	3	1	2	2	...	...	...	...	25
Total	3	1	1	5	11	4	5	4	7	6	12	7	4	7	5	7	6	8	10	8	9	5	7	2	5	3	...	152
Totals	8	9	13	19	66	93	82	122	135	146	173	616	505	338	390	408	325	267	356	339	321	297	222	261	183	126	81	6,112
Deduct cases sent to Hospital included in Doctors' Returns	...	...	...	...	...	...	...	...	...	...	...	45	30	32	37	66	26	30	39	19	28	25	24	26	21	8	5	461
Total Cases	8	9	13	19	66	93	82	122	135	146	173	571	475	306	353	342	299	237	317	320	293	272	198	235	162	118	76	5,651
Deaths { Garrison	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2
Deaths { Hospitals	...	...	...	...	2	2	6	3	4	3	11	12	9	13	13	12	19	13	13	13	17	9	6	3	5	1	...	207
Deaths { Doctors' Returns	...	...	...	...	...	...	...	...	...	...	...	3	5	16	14	15	7	8	9	9	12	16	8	10	9	10	...	151
Total deaths of fever recorded	...	...	...	...	2	2	6	3	4	3	12	15	14	29	27	27	26	21	22	23	29	25	16	13	14	11	...	360
Funerals in city	...	...	...	...	...	...	...	...	...	...	...	...	21	57	64	63	87	72	87	65	83	61	60	58	57	60	39	913

Number of Cases 6,112
Deduct sent to Hospital, included in Doctors' Returns 461

Total Cases 5,651

Deaths recorded of fever ... ... 360 = 6·37 per cent.

In examining the Diagram E, will be noticed the sudden influx of cases from 173 in the previous week to 571 in that ending 19th September. It was during this week that the city was divided into six districts, and a medical man appointed to each, who were thus enabled to discover many cases before unknown. There was then an almost equally sudden fall, but the rate was still very high. It again rose till the 17th of October, which was followed by a considerable fall to the 31st October; but this, I fear, was more apparent than real, as during this interval two medical men died of fever, two more sick, and others had resigned their districts; therefore the returns for that period are very imperfect. On the 2nd of November the city was again subdivided into twelve districts (Plan A), with a Doctor and a Streetkeeper to each district; and then only was the state of the city properly grappled with, and the scavenger and the whitewasher turned loose on the fever-nests; and the Diagram E shows in a marked manner how rapid and effective were the results of these measures.

The diagram and return are only carried on to the 2nd of January, 1868, as that was the last date any returns were sent in; and after the 5th of January the medical men ceased to be employed by the Government, but continued in charge of such patients as still required attention, and any new cases were referred to the Dispensary for treatment.

The second wave marks the admissions with fever into the Civil Hospital, and is remarkably in keeping with the greater wave of new cases. In the lines showing the deaths, it was only on the 24th of September that any record of the funerals was taken, as a guide to the mortality of the epidemic in the city. It was then discovered that about 20 per 100 of the population were dying weekly, or over 100 per 1,000 annually, and that the vast majority were totally unaccounted for as to their cause, as neither the returns from the hospitals nor from the medical men accounted for even one-third of them.

The funerals were counted by the signal-man stationed on the Lion's Rump, and he gave a daily return of the number, and the different cemeteries they were taken to. Imperfect as this is as to the cause of death, it at least shows that there was a vast amount of disease of which the medical men were not at all cognizant. Up to the 19th of September the death-line is that of the recorded deaths from fever at the hospitals; and, as returned by the Doctors, this is carried on by the dotted line. The only value of this is, that out of a known number of fever cases the fatality was very slight, whilst a very great mortality remains unaccounted for. Still some portion of this difference may arise from the average mortality of a city of 30,000 inhabitants, cases in private practice not included in the returns, and the habits and customs of the coloured and Malay races. Thus, in Diagram F, I have divided the reported funerals from the 24th of September, 1867, to the 13th January, 1868 (in all, 986), into races. Of them, 287 were whites, that is, Europeans or the white races; the coloured were 295: these include Negroes, Kaffirs, Hottentots, Mozambiques, and half-casts; and the Malays (Mahommedans) were 404. It also gives a clue to the relative proportion of the different races affected, and quite agrees with the actual proportion of the population of each class. The results to be deduced from these Tables appear to be, that an epidemic of fever visited Cape Town; it commenced about the 1st July, and reached its climax on the 20th September, 1867, and finally ceased in January 1868. During this period there were 5,651 known cases of fever; of these, 1,421 were admitted into the Civil Hospital; and that the fatal cases were 360, or equal to a mortality of 6·37 per cent. of the total cases of fever.

Before entering upon the character of the fever, I may refer more especially to the district I had charge of. The daily wave of fever in it is, I believe, a very fair representation of the fever in the other districts also.

The remarkable fall in the wave on the 2nd November was the result of the subdivision of the city into twelve districts; as when I took charge, in the first instance, on the 29th of October, of what was the fourth district (but afterwards divided into the fifth, sixth, seventh, and eighth districts), I received over a list of 98 cases, as then under treatment, from the medical man previously in charge; these were, on the 2nd November, transferred with their proper districts. The other great rise, from the 7th to the 9th December, was in consequence of the services of six doctors being dispensed with, and two districts

given to each of the remaining doctors; but they were taken on again on the 10th December. I have therefore carried on the wave for my own district (No. 5) by the dotted lines, and the red marks show the mortality in the district.

Having thus traced the causes, it is now necessary that the character or type of the epidemic should be investigated; and here a difficulty at once arises from the imperfection of the returns and information afforded by the medical men; but before referring to my own district I shall give the opinions of the other medical men, as far as I have been enabled to obtain them, and then inquire how far my own experience of the epidemic agrees with theirs.

Port Elizabeth.—Dr. Roubridge writes to the Medical Board here, with reference to the outbreak at Port Elizabeth, and asks "Whether your fever "and ours is the same? We have had, since about June last, cases of irregular "remittent fever, running, on the one hand, into continuous, on the other "into intermittent, without rose-spots or mulberry rash; with little or no "iliac gurgling, with hæmorrhage from the nose, and occasionally from the "vagina; spongy gums, yellow conjunctivæ, high-coloured urine, enlargement "of liver and spleen; cases occurring in blacks and whites, but unlike our old "abdominal typhoid; more severe and rife among the indigenous blacks. "The remedy, quinine. I have lost but one case (a Kaffir), whose body I "examined, and found the liver large, and with biliary congestion; the spleen "four times its normal bulk, black and soft; a good deal of congestion of both "large and small intestines, but no *peyerian* affection. The fever is certainly "not contagious, and appears to be, pretty nearly, equally frequent in the high "and low parts of the town; but is of a more severe type in proportion to the "crowding and want of ventilation among Malays and blacks.

"The fever is doubtless of malarious kind, modified by climate and local "circumstances, and shading into ague on the one hand, and miasmatic yellow "fever on the other.

"I have had several cases in which there was 'black vomit' and uræmic "coma and collapse. The severe rheumatic-like pains in the limbs, particu- "larly about the shoulders and wrists, and in the back, and the obstinate sleep- "lessness, are well-marked features.

"Typhus, with mulberry rash and contagious, I have never seen in the "colony; typhoid peyerian, with rose-spots, dark-brown tongue, quite early; "iliac gurgling; killing generally by perforation of the ulcerated peyers glands "is our old and hitherto almost only local fever.

"I distinguish the present epidemic from it by—1st. Its irregular course, "and its great tendency to relapse.

"2nd. By the white woolly tongue, only in rare instances approaching to "the brown of typhoid.

"3rd. By the biliary and hæmorrhagic tendency, from spleen and liver "complications.

"4th. The pains in the limbs, so like rheumatism.

"5th. From the negative signs which prevailed in the old typhoid rose- "spots, and peyers gland affections.

"6th. From the subjects of it being, quite as frequently, if not more so, the "indigenous and long-naturalised races, in whom it has become a matter of "doubt for some years, whether we ever saw a genuine case of typhoid fever.

"7th. The readiness and certainty with which quinine, combined with "aperients, cures it; whereas nothing but its own undisturbed course cures "typhoid."

In another communication he states, "I have had another *post-mortem*. The "subject died of 'uræmic coma.' There was no 'black vomit,' as in the "former case; the conjunctivæ and fat (near an inch thick) were stained deep "yellow; the ileum much congested, with dark patches as if stained with "some pigment; no affection of peyers glands; liver weighed 4½ lbs., spleen "17 ounces.

"I call this fever, marsh or miasmatic fever, from its spleen and liver affec- "tions, from its remitting or sub-remitting character, its surging on ague on "the one side, while other cases assume every character (including the viru- "lence) of yellow fever, with its black vomit, its jaundiced skin, and sup- "pressed urine. It is, in my opinion, the 'febris icterodes,' the bilious

"remittent fever of hot climates, mitigated by the temperature and general "salubrity of our climate."

To the graphic description of the fever as it appeared at Port Elizabeth, I need not add a word, as it is evidently a faithful picture of what such a keen observer of nature as Dr. Roubridge actually saw and so lucidly describes.

Stellenbosch. -The next place that comes under review is Stellenbosch, and my information with regard to it is derived from conversations with Dr. Smuts, under whose care the majority of the cases were. He, as already mentioned, traced its commencement to contagion from Cape Town. The cases were not generally very severe, and were confined to one locality. I may here mention that Stellenbosch is a remarkably clean and quaint-looking place, the streets all lined with fine old oak-trees, and clear full streams of pure water running down the sides of every street. The stamp of cleanliness is everywhere, and therefore there was no nidus for the production of fever in that place, which was actually confined to a street inhabited by coloured people, who were rather overcrowded in it. The removal of the sick, and whitewashing, appeared to have completely checked the epidemic. Its character was a typhus accompanied with regular pretechiæ; no *post-mortem*; indeed out of the 30 cases only two died.

Simons Town.—At Simons Town the fever was severe, but of short duration; and I have to thank my friend, Dr. Rickards, R.N., for a series of cases illustrative of the type of the fever, and reports of autopsies, the more valuable as (with the exception of those made on two soldiers at Cape Town) no *post-mortem* examinations were made, either in the districts or in the Civil Hospital. In the town there were insuperable difficulties to prevent it, but not in the hospital, therefore the few *post-mortem* reports are of great value.

Dr. Rickards writes, "As far as I can state from the cases in hospital" (Royal Naval Hospital at Simons Town), "every one had the typhoid type, "and in some instances exceedingly well marked"; whilst in the Civil population there, the medical man describes his cases as being of the typhus type, occasionally declining into "continued," but none of a typhoid character; but I have not seen any report of a *post-mortem* of his cases whereby to test the cause of difference between the Civil population and the Naval and Military in that small town. Besides the civilians, there were Kroomen attached to the dockyard, for whom a temporary hospital was prepared. About 20 cases were admitted, and either 2 or 3 died; but I have no particulars about them, as the Medical Officer who was in charge of them had left the colony.

In the Royal Naval Hospital there were "16 cases of confirmed fever, and "3 deaths. We did not diagnose simple feverish symptoms, or febricula, as "being *the* fever then prevailing, and hence our number only amounted to 16."

The following abstracts of the cases are the best illustration of the true character of the fever, but first I shall give the cases of 3 gunners who were landed from Her Majesty's ship "Orontes" on her return from the Mauritius, where these men had been stationed some time, and where they had suffered from the epidemic fever at that place. I may also draw attention to the fact that these men were admitted into hospital on the 24th of July, 1867, whilst the first case of epidemic fever was not admitted until the 1st of November.

Case 1. Gunner Michael A—, ætat. 23, Royal Artillery, admitted into hospital, from Her Majesty's ship "Orontes," 24th July, 1867, for "febris re-"mittens et sequelæ." Sketch of military case:—Repeated attacks of the epidemic remittent fever now prevailing at Mauritius, and occasionally complicated with dysentery; much reduced; enfeebled; enlarged liver and spleen, and general malarious cachexia. On admission, purged about 18 times in 24 hours; motions mixed with blood; ternesmus; abdomen tympanitic; tenderness in right iliac and hepatic regions; tongue moist and clean; pulse fair, 80. He gradually improved till discharged to Cape Town, 10th September. He had attacks of ague on a few occasions.

Case 2. Gunner Joseph P—, ætat. 26, Royal Artillery, admitted and discharged as previous case, and similar reports. Tongue dyspeptic, with white rough body and red apex; purging; tympanitic; ague during stay in hospital. There was some difference in these cases, although in many symptoms they were similar.

Case 3. Gunner Edward M—, ætat. 29, Royal Artillery, admitted 24th July,

died 30th July, 1867; similar military report and medical history as in cases Nos. 1 and 2. On admission, dysentery was the principal feature of his case; tormina; prolapsus ani; tenderness over hepatic region, across abdomen; been purged 24 times; tongue moist, brown; pulse 140; abdomen tender and tympanitic; tongue moist, but with dirty centre and red edges; cough; expectoration free; sputa dark, grumous, and muco-purulent; dyspnœa. Greatly prostrated; breathing hurried; looks anxious; constantly purged; pulse small and weak; soreness over abdomen; tympanitic and gurgling; wandering; pulse 150, thread-like. 30th. Been much worse for some hours; skin quite cold; eyes rolling; tossing arms wildly in the air; low muttering delirium, with occasional violent outbursts; incoherent; speechless; purged constantly; involuntary evacuations; picking bedclothes, and "musca volitantes"; rational at times, for a little; sinking fast; died.

Post-mortem 22 hours after Death.—Effusion of serum and pus in pelvic cavity; rectum and colon thickly studded with ulcerated patches, and perforation in several places; spleen and liver enormously enlarged and congested.

Case 4. Private R— O—, ætat. 24, 1st Battalion 9th Regiment, admitted 1st November, discharged 11th December, 1867. Headache and flushing of face; general pyrexia; pulse 96. No sleep from headache; tongue dry and furred; great thirst; vomits; tenderness in gastric region; pulse 100. Pain in head disappearing; tongue moist at edges, with a white dry fur in centre; skin acting; thirst urgent; tenderness over abdomen; great prostration and general tremors, with feeling of lassitude and pain in the legs. No spots; pulse falling; prostration principal complaint; tongue moist at edges, dark-brown centre; skin pungent; bowels moved several times; motions like pea-soup; tongue dry and furred; rambling, restless, and delirious; abdomen tympanitic; drowsy, groaning, and starting; considerable nervous twitching; no pain, but lies in a listless and exhausted manner, with eyes shut; pulse declining (48). About the 15th day symptoms became mitigated, and gradually became convalescent, leaving him greatly prostrated.

Case 5. Private J— C—, 1st Battalion 9th Regiment, admitted 4th November, discharged 9th December, 1867. General indisposition for some days; now seems heavy; disinclined to answer; eyes vacant, and of a startled appearance; face flushed; extreme headache; hot, dry skin; full, quick pulse; dirty and furred tongue; great thirst; constipation; scanty, high-coloured urine; wandering, and endeavouring to get out of bed. Sleepless; headache; pain in abdomen; bowels open; pains in legs and joints; pulse 96, fair volume; tongue moist, but covered with thick fur; great prostration and nervous tremor; feelings of lassitude; pain in right iliac region, with gurgling. Sleepless, but quiet night; throat sore; some suspicious spots on trunk; tenderness in right iliac region; bowels frequently moved, and of a light-coloured matter; manner same, anxious and troubled; appears suspicious; great tremor. About the 15th day symptoms mitigated, and slowly became convalescent.

Case 6. George S—, stoker, Her Majesty's ship "Peterel," ætat. 30, admitted 5th November, discharged 19th December, 1867. First under treatment on board; general pyrexia; nausea; pain in joints; lassitude; febrile symptoms increasing, and assuming a remittent character, with considerable prostration and raving; epistaxis; tongue moist, dirty, and covered with thick fur; rambling, and attempting to get out of bed; little tenderness in right iliac region; conjunctivæ much injected; lies in a listless and languid manner; passed water in bed; considerable coma; pulse 120, full, strong. Some suspicious spots about trunk; great nervous prostration and tremor; pulse declining; tongue cleaner, moister; still passes water involuntarily; bowels confined. Delirious; protrudes tongue with difficulty; abdomen tympanitic; pulse fully compressible and irregular; catheter used daily; bowels purged; restless; muttering and rambling. On the 12th day in hospital had a quiet sleep for several hours; symptoms gradually declining, and slow convalescence.

Case 7. Walter P—, ætat. 30, captain of main-top, Her Majesty's ship "Peterel," admitted 5th November, discharged 19th December, 1867. Was under treatment on board ship prior to admission into hospital. The symptoms were principally as in the case before (No. 6). Bowels purged; tenderness over cœcum, with general tympanitics; rose-coloured spots thickly spread over abdomen; tongue same characteristics as former cases—dry, edges moister, but

with dirty brown fur in centre, tremulous, crusted, and almost black; great prostration and thirst; rose-coloured spots well marked; considerable nervous tremors generally; protruding tongue with difficulty, and so until convalescence.

Case 8. David D—, ætat. 22, stoker, Her Majesty's ship "Peterel," admitted 7th November, discharged 19th December, 1867. Under treatment at first on board ship; symptoms as in previous cases; skin hot and pungent; pulse high, &c.; rose-coloured spots spread over trunk; epistaxis tympanitis; no particular diarrhœa.

Case 9. James D—, ætat. 22, private, Royal Marines, Her Majesty's ship "Peterel," admitted 7th November, discharged 19th December, 1867. As before; rose-coloured spots evident; tympanitis; diarrhœa; tenderness in right iliac region; considerable nervous trembling generally, hands and tongue in particular; pulse gradually declining; continued to steadily improve.

Case 10. David B—, ætat. 29, A.B., Her Majesty's ship "Seringapatam," admitted 12th November, discharged 23rd December, 1867. Similar previous symptoms; purged a great deal; great prostration and nervous tremblings; rose-coloured spots easily seen; tongue dry and red at circumference, moister, but heavily loaded with dark-brown fur in centre; great thirst; skin hot and pungent; delirious; accelerated respiration; tympanitis; great purging, with tenesenus; tenderness in iliac region; sordes on teeth; is exceedingly low, very enfeebled, and prostrated; motions clay-coloured; 16 days after admission, symptoms declining; returning to health slowly.

Case 11. Joseph H—, ætat. 21, corporal, Royal Marines, Her Majesty's ship "Seringapatam," admitted 14th November, discharged 19th December, 1867. Symptoms similar to the former ones; same peculiarity of tongue—dry, red at circumference, moister, but thickly loaded in centre; considerable nervous tremor; abdominal uneasiness; tympanitis; excessive thirst; great prostration; improving about the 14th day of treatment.

"There were some other mild cases, in so far as that the symptoms were "not so well marked as the foregoing, but nevertheless requiring great care and "lengthened treatment.

"Thus you will see that all our cases have been of the typhoid character, "although all the cases did not have the rose-coloured spots, still the other "symptoms in relation with typhoid were strongly marked. The tongue, in "nearly all the cases, had the same abnormal appearance referred to. The great "prostration and general nervous trembling, more especially of tongue and "hands, was a marked symptom in all; likewise head symptoms, with occa-"sional coma or semicomatose condition, varying with delirium."

Case 12. John R—, ætat. 32, Quartermaster, Her Majesty's ship "Peterel," admitted 5th November, died 12th November, 1867. Placed on list suffering from febrile symptoms, with diarrhœa, and being unwell for some days; increase of fever: tongue getting brown, and delirium with prostration of strength; bowels purged; rambling, with twitchings and tossing about in bed; pulse 120, strong; skin hot and dry; protrudes tongue with difficulty, and unwillingly; dry, crusted, and sordes about teeth; somnolent; lies generally on left side; no complaint; respiration regular, but accelerated; tenderness over cœcum; passed catheter. Aspect brighter; tenderness over right iliac and hypochondriac regions; pulse 115, firm; unable to protrude tongue, which is dry, crusted, and glazed; teeth covered with sordes; extreme prostration and nervous tremors, especially of hands and tongue; some very suspicious spots on abdomen, rose-coloured. Pulse 84, more compressible and irregular; still continuing to pass catheter; bowels not moved; wandering; breathing hurriedly and heavily; unable to protrude tongue, which is exceedingly tremulous; skin warm and perspiring; remains on his back. Passes water naturally; bowels still confined; considerable twitchings of hands; tongue rough and dry; objects to nourishment, struggles against receiving it; tympanitis, and considerable tenderness in right iliac region; pulse 140, weak and irregular; gradually became worse, and died.

Post-mortem 6 hours after Death.—Body generally emaciated; lungs and heart healthy, but effusion in pericardium; inflammatory action of intestines, with numerous bands of adhesions; a few congested spots in cœcum, no perforation; other organs healthy.

Case 13. Robert H—, ætat. 27, labourer, Military Store Department, admitted 27th November, died 11th December, 1867. Indisposition for three days; headache; pains in back and legs; general feeling of lassitude; rigors; foul and tremulous tongue; bowels constipated; pulse 120, full; skin pungent and dry; urine high-coloured. Restless, sleepless nights; pain in head, in limbs less; no abdominal tenderness; pulse 90, weak. Pains in limbs worse; skin hot; tongue moist and tremulous; pulse 90, small; thirst; unable to sleep; seems unable to rise without assistance; becoming prostrated, anxious, and frightened; claiming medical and clerical assistance, but for no object. Very weak; bowels confined: thirst becoming urgent; pulse 108; skin hot. Pulse 120, small; hands tremulous; seems nervous and dejected; tenderness in right iliac region; rambling; purged several times; abdominal tenderness and tympanitis. Pulse 120, almost imperceptible; general tremor pervading body; very anxious; thirsty; rambling; delirious, and getting out of bed; purged constantly. Pulse 124; skin dry and hot; passed motions involuntarily; becoming greatly prostrated, and much worse; perfectly unconscious; passes light-coloured motions continually in bed; twitchings of hands; nervous tremors; "musĉe volitantes"; subsultus tendinum, and gradual dissolution.

Post-mortem 10 *hours after Death.*—Lungs exhibited healthy structure, but pleural adhesions existed; heart healthy; left side of heart almost empty; some pieces of fibrinous, fatty structure on right side; some effusion into pericardium; liver healthy; gall-bladder full. The whole of the intestines exhibited inflammatory action; deprived of the natural soft unctuous feel, and of a dull colour; sticky and agglutinated and bound together by fibres of adhesion; considerable distension and flatus, especially in cœcum; whole exhibited patches of congestion, but no apparent ulceration.

These cases give a graphic view of the epidemic at Simon's Town, where it is evident the typhoid or pythogenic form of fever prevailed; and although it has been stated that "typhus fever" was the type amongst the civilians, I have reason to believe that it was the pythogenic fever with the proper rose-coloured rash; for the cases admitted into the Royal Naval Hospital were principally persons who were living in the neighbourhood where the epidemic prevailed.

Having thus far seen that the fever, as it appeared in other localities, was of a pythogenic character, in some instances assuming the typhus character, it now is requisite that I should examine into the character of the epidemic in Cape Town. In doing so, I must in a very great measure depend on my own experience whilst in charge of a district, as the information that I could obtain from the other medical men is very meagre, but which I shall give further on. Dr. Ross, however, has entered more fully into the subject; and the following extracts of a letter from him give a very fair view of the disease. He writes,—

"Our fever is essentially of local origin, fading into mild remittent, or intensi-
"fying into typhus if neglected, or attempted to be cared for in the overcrowded,
"stinking, and ill-ventilated houses of our labouring classes. There are no
"rigors, nothing to mark out a quotidian or tertian character, no entire typhoid
"symptoms, no iliac gurgling, no enlarged spleens, no special irritability of
"the bowels. Average duration of treatment, 10 to 12 days; recoveries very
"numerous; death due, in most cases, to failure of heart's action by anæmic
"syncope, if suddenly moved or shaken, or else to gradual progress of uræmic
"poisoning, with palsy of bladder, suppression of urine, quiet, non-stertorous
"breathing, intense deafness, &c."

He divides the disease into four stages:—"1st. Prostration; 2nd. Excite-
"ment; 3rd. The critical; and 4th. The convalescent stages.

"During the first or prostration stage, complains of being tired; bad head-
"ache, and aching in the muscles; the tongue furred and woolly, or studded
"with bright red papillæ here and there; want of sleep. I regard this as the
"commonest of our epidemical fever, and so clear him out by giving all adults
"2 grs. of podophylline, and 1 dr. of ipecacuanha. Next day I would order
"him 2 grs. of quinine ter in die for 48 hours. If at the end of that time he
"has lost his headache and regains cheerfulness, and has got no pink flushes on
"his cheek-bones, you may be pretty certain you have cut short an attack of
"remittent fever. If, however (as only too frequently happens), when you are
"sent for late, there is a red, angry flush on the forehead, as from wearing a

"tight new hat, with cheeks of a dull blotchy pink, great pain in the back, "acute headache, sensitiveness to light and sound; tongue beefy, clean, but "inclined to be glazed at the tip, and hot to the touch. In the second or "excitement stage the patient goes on from bad to worse; the skin becomes "burning hot; great thirst; the features become wild, worn, and haggard; "the slightest sound agonizing to the ear; while the eye is angry and "frightened, with small, maniacal pupil; excruciating headache, with intense "wakefulness; loathing of food, inability to raise oneself in bed, &c. If not "checked, we pass out of the circle of remittent fever, and approach the "dreaded region of tyhpus and acute cerebro-spinal meningitis, with cold, dry, "harsh tongue, dullness of hearing, and relaxation of the voluntary muscular "tissues. About the 5th or 6th day the patient will then cease to be so noisy; "he will still wander a little in his mind, but he is less actively destructive; "you will then see mulberry spots and petechial patches scattered about his "sternum, abdomen, forearm, &c., not disappearing on pressure; the tongue "becomes smooth and glazed, hot, dry, and with great difficulty and indecision "protruded; the deafness increases, and there is much thirst. If in two days "more the typhus gets the upper hand, the tongue becomes rough, dry, harsh, "parrot-like, and cold; the bowels distinctly costive; the skin cool, but dry; "and at this point, about the 7th day, you may have severe bleeding from the "nose. Should, however, effusion have taken place at the base of the brain, "the case assumes the character, fortunately rare, of cerebro-spinal meningitis; "there is dilated pupil, stupid stare; risus sardonicus; tetanic twitchings of "the facial and masseter muscles, with sharp delirium, tendency to get out of "bed, resistance to restraint, &c. It is the last flare of the candle; uræmia "gradually supervenes; the urine becomes very scanty and highly acid; pro-"fuse sweats, but not always; the breathing falls to 6 or 8 in the minute, "without stertor; a great tendency to lie flat on the back and slip to foot of "bed, with the head thrown back and very low; there may then be a fit; a "period of calm quiescence; then death.

"During the third and fourth stages, all cases need careful supervision; "neglect of the bowels is sharply punished by the return of many ill symp-"toms; and you require to persevere with small doses of quinine, &c., so as to "recall the appetite and guard against relapse."

In the following extracts from the Reports by the medical men who were in charge of districts, in reply to certain queries from the Colonial Office (by permission of the Colonial Secretary, the Hon. Mr. Southey, to make use of the same), I shall endeavour to give the opinions of the several medical men as to the type and character of the epidemic, and such other information as may refer to the object of this Report.

Dr. Landsberg states, "The form of fever which came most frequently "under my notice was of a low typhoid type."

Dr. Abercrombie, jun., states that "The disease, as I saw it, was decidedly "typhus, with a heavy death percentage, say from 15 to 20 per cent.; but after "this time the disease gradually became milder, for although we still had the "intense headache and deafness, the constipation and tendency to retention of "urine, the sleeplessness and dry tongue, the delirium, in many cases with the "mulberry rash, the death percentage became very small. A peculiarity in "this epidemic has been, in many cases, the rapidity of the pulse—so rapid that "it could not be counted; and although the patients were at the same time "in a state of delirium, with dry tongue, &c., these cases almost invariably "recovered. A good instance of this occurred in a gentleman who was attended "by Dr. Ebden and myself, and who recovered. The only good symptom about "him, at one time, was the state of his respiration, which was not hurried, in "proportion to the heart's action. Intemperate persons, especially Malay beer-"drinkers, were carried off to a certainty. One could recognize the latter by "their peculiarly smooth-looking skin, almost oily."

In reference to the treatment, he mentions, besides diaphoretics, ammonia and small doses of quinine. "Repeatedly blistering the head in comatose "subjects was attended with the happiest results. To illustrate this, I shall "quote the case of a Malay man whom I was examining, when several of the "bystanders exclaimed, 'That is not his proper colour, Doctor; he is a light-"'coloured man!' The fact was, he was from head to heel of a very dusky

" hue, in a comatose state, passing his urine involuntarily, having great diffi-
" culty in swallowing even liquids, and pulse almost imperceptible. This man's
" head was repeatedly blistered, and, with the exception of suffering from albu-
" minuria for a short time, he has quite recovered.

" The bromide of potassium (in cases of restlessness with head symptoms),
" in doses of 20 grains every two hours, did a great deal of good."

Dr. Fleck writes, " The cases that have come under my notice have been of
" a gastric, bilious, typhoid form, sometimes ending in regular typhus, when it
" became contagious." Again: " According to my idea, the fever is nothing
" new, particularly in this colony. I am also of opinion that it was not
" brought to us from the Mauritius, but that we shall always have it more or
" less, if the causes stated by me are not attended to." (Inadequate water supply, dirt, and overcrowding.) " In former times, this type of fever was
" known in the colony, amongst the slaveholders, at the mission stations, and
" all overcrowded, ill-watered localities."

Dr. White states, " The general form of the fever has been gastric or
" bilious, varying in the symptoms according to circumstances and constitution.
" Simple and uncontagious in its original form, but from constant recurrence
" assuming an epidemical constitution, and hence becoming more severe in
" character, and, like all fevers, mutating from one variety to another—many
" cases becoming truly typhoid, with papular typhoid eruptions, ultimately
" affecting the cerebro-spinal system, which constituted most of the fatal cases;
" but remittent or intermittent cases I have not met with, nor with a case of
" true typhus, or English malignant putrid fever, with petechiæ."

Dr. Jackson says, " The forms of fever I have generally met with are
" famine fever, or a low typhous and true typhus."

Dr. Chiappini, senior, mentions, " In the great majority of instances it was
" a low nervous type of fever. About 12 per cent. of all the cases I had to
" treat were genuine typhus."

Dr. Roux:—" Bilious remittent, running into continued fever, with com-
" plications. The true dothiementeric, with its well-marked eruption, has
" frequently been observed."

Dr. Ross mentions that " At the height of the epidemic I saw many severe
" cases of bilious remittent fever, tending to recovery within ten days or so,
" and shading insensibly away into simple marsh fever on the one hand, or
" intensifying into acute typhus on the other. Latterly I have seen many
" cases of common continued fever, with occasional instances of cerebro-spinal
" meningitis; but no case of typhoid fever has come under my care." But I have already fully quoted from another communication from Dr. Ross.

Dr. Abercrombie, senior, appears to consider that both typhoid and typhus fevers prevailed, but the latter were in the " far greater number."

The other medical men did not send in any answer to the queries, and my replies are of course embodied in this Report.

In addition to the foregoing, Dr. Laing, in charge of the new Somerset Hospital (Civil), when forwarding me a return, &c., of the admissions, &c., in hospital, writes, " The first cases of the late epidemic fever were admitted into hospital
" on the last of June, and, as you will see by the returns, gradually increased.
" The fever was of a low typhoid type, with parched tongue, and the pulse
" seldom exceeding 80; and was without doubt engendered by starvation,
" crowded apartments, and during the first months of its appearance the cold
" and raw weather contributed their share. I also fancy that the burning of
" charcoal in the apartments, for the purpose of heating their rooms, must have
" contributed its share in poisoning their systems."

" The disease appears to have attacked very few of the better classes, although
" of a very infectious character, as all the male and female nurses in both hospi-
" tals caught the infection, and suffered most severely. The wretched state
" of destitution in which hundreds of these coloured people were brought to
" hospital was fearful. Emaciated to the last degree, crawling with vermin,
" and with scarcely a rag to cover their nakedness. Several died shortly after
" admission, and many admitted in a state of delirium.

" The means used were very simple. It was wonderful to witness the
" rapid and extraordinary improvement almost immediately after a warm bath
" and the refreshing sleep produced by large doses of morphine and camphor.

"This was followed up by quinine, and wine, and good soups; and in most "of the cases the convalescence of the patients was complete in about 14 days. "In many of the cases coma prevailed. Blistering the head was found of great "benefit, and carbonate of ammonia and brandy, administered freely, proved "eminently successful. Some of these cases were long in recovering; and in "several, inflammation of the parotid ending in suppuration. In four cases "we had hemiplegia, but all recovered. In three cases mania succeeded the "delirium. Bed-sores were very frequent and troublesome. From a variety "of causes, I regret to say that no dissections were made; but, from the symp- "toms, there were convincing proofs that both cerebral and spinal meningitis "generally existed. The intense headaches, pains in the cervical and dorsal "regions, with, at times, severe tetanic twitches, were almost always present. "Vomiting was a troublesome symptom, and numerous cases of paralysis of the "bladder necessitated the frequent use of the catheter. In the cases attended "with furious delirium, the cold 'douch' was found of great service.

"The mortality at this hospital was nearly 15 per cent.; but as many "were brought in the last stages of fever, no fair criterion of average can be "drawn."

Dr. Chiappini, jun., who was placed in charge of the old Somerset Hospital, states that "no *post-mortem* examinations were made in the old hospital.

"*Type of Disease.*—Almost all admitted into this hospital were cases of "low nervous fever.

"The patients I had to treat were, generally speaking, destitute and half- "starved,—many of them filthy in their habits. About one-twelfth of the "number received into hospital were cases of genuine typhus."

In the old hospital there were 689 admissions and 93 deaths; in the new hospital, 732 admissions and 114 deaths; making a total of 1,421 cases and 207 deaths, or 14·49 per cent. But the total deaths of the known cases of fever only reached 6·37 per cent. out of 5,651 cases. (See Return D.)

The sickness in the garrison now claims our attention. In it there appear to have been 152 cases, in a total strength of 1,929 persons, or nearly 8 per cent., whilst the deaths were only two cases.

TABLE H.—RETURN of Fevers in the Garrison at Cape Town, from 1st July, 1867, to 2nd January, 1868.

Strength ..	Officers.	N. C. Officers and Men.	Men, Civil Department.	Women.	Children.	Total.
	83	1,239	47	208	352	1,929
Cases of Fever ..	1	93	16	17	25	152
Per cent. of Strength..	1·20	7·50	34·04	8·17	7·10	7·87
Deaths..	..	2	..	..	..	2
Per cent. of Deaths ..	..	0·16	..	..	..	0·10

In this Return, the non-commissioned officers and men were all treated in hospital, and those classed under "Men, Civil Departments," include artificers and labourers attached to the Military Store and Commissariat Departments not treated in hospital, and who live principally about the neighbourhood of the Castle, in the locality marked in red in Plan B; and this accounts for the enormous disproportion in the number of cases compared with the other classes. The troops in garrison comprised a half battery of Royal Artillery, half a company of Royal Engineers, the 1st Battalion 9th Regiment, and a wing of the 99th Regiment; also 15 men of the Cape Mounted Riflemen. A portion of these were at Wyneberg for short periods at rifle practice. All the cases in the Royal Artillery, Royal Engineers, and Cape Mounted Rifles, were simple continued fevers. In the 1st Battalion 9th Regiment there was only

one case of "typhoid"; the others (47) were all "continued" fevers—of them two proved fatal, of which the following are abstracts of their cases:—

Case 15. Private William Douglas, 1st Battalion 9th Regiment, ætat. 28; nine years' service,—one year on the station. Admitted into hospital, 11th September; died, 14th September, 1867. A strong and powerfully-made soldier. When admitted into hospital, he was suffering from slight febrile symptoms. Stated he had been on pass for some days, having just re-engaged, and received his bounty-money, all of which he spent. On making enquiries, I have learned (Dr. Carroll, 19th Regiment) that he had been drinking constantly (and in large quantities) raw spirits.

On the night of the 11th inst., his head became affected,—there was considerable cerebral disturbance. He was very restless; wandering; with difficulty could be kept in bed. On the 12th and 13th, the head symptoms became more aggravated, accompanied with considerable fever; dry and furred tongue; pulse full and quick, with the symptoms of congestion of the brain. He died on the morning of the 14th inst.

Post-mortem Appearances.—All the organs of thorax and abdomen found in a normal condition. The brain and membranes were extremely congested.

Case 16. Private J. Bamford, 1st Battalion 9th Regiment, ætat. 27; nine years' service—two years on the station; admitted 14th November, died 22nd November, 1867; a strong and healthy-looking soldier. Was admitted on the 14th of November with fever of a continued type. On the 15th no alteration; pulse continued full and quick; a dry, hard tongue; hot skin; excessive thirst. On the 18th there was decidedly less fever, but the pulse became feeble, and there was slight congestion of the left lung; tongue continued dry but clean. On the 19th he became much weaker; was exceedingly prostrated; had frequent watery evacuations from the bowels; pulse small and feeble; tongue brown; very restless; respiration hurried and laboured. From that date the symptoms became more aggravated; debility increased; pulse weaker; tongue brown, hard and dry; teeth and lips covered with sordes; evacuation passing involuntarily. He sank and died on the 22nd November.

Post-mortem Appearances.—Body emaciated; syphilitic bubo in left groin; small bed-sore.

Thorax.—Left lung congested, but otherwise healthy; right lung adherent throughout its entire extent to the parietes of the chest, its substance much congested. Heart very small, anæmic, and flabby; valves in a normal condition.

Abdomen.—Liver small, pale, and flabby. Gall-bladder partially full. Intestines much distended with air; free from congestion or perforation. Kidneys healthy.

The following is a very good typical case of the character of the great majority of cases:—

Case 17. Private W— R—, Cape Mounted Rifles, ætat. 24, service four years, admitted 27th August, discharged 27th September, 1867; disease, febris continua; a strong-looking soldier. Was admitted into hospital on the 27th August with febrile symptoms, accompanied by severe headache; pulse full and quick; loaded tongue; skin hot and dry; thirst; bowels regular. 28th—Continues same way, but was very restless during the night. 29th—Much the same. 30th—Head symptoms during the night; wandering and very restless; conjunctival vessels much congested; pulse 90, small and quick. 31st—No material alteration. September 1st (seventh day)—Somewhat better; head symptoms less severe; slept much better; ideas more collected; pulse 88, and feeble; tongue clean; skin more moist; blisters discharging freely. After this, steadily improved.

In the 99th Regiment, on the other hand, the fevers, with a few exceptions, were more of a remittent or intermittent character; but this is accounted for: that those men who were attacked had recently come from China, where they had fever previously, and were already predisposed to intermittent fever. They were almost all very mild cases, yielding readily to treatment. Several of these cases were sent in from Wyneberg, and accounted for the attacks by exposure to the sun whilst at rifle practice.

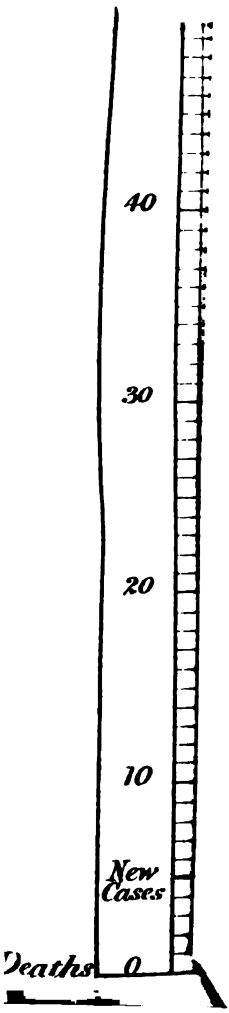
In Case No. 15 we have an extreme case, the result of intemperance; and

this man spent his time in the neighbourhood of Glynn Square. It was also at this time that the arrears of the increased pay were issued; and under the new regulations a large number of men re-engaged, and of course received the bounty, the greater part of which was spent in debauchery and in the fever-seed plots. The small proportion of the military that were affected speaks well for the sanitary condition of the barracks.

This Report has already exceeded the limits I proposed for it. I must, therefore, shortly refer to the district (No. 5) I had charge of. In Diagram G are shown the daily "admissions," "under treatment," and the "deaths," the latter marked in red. The district may be divided into two distinct portions by the Butengracht (see Plans A and B). Below, the streets kept clean, and drainage in some degree attended to; above it, completely neglected; the drains, of rubble pavement, full of holes and cut of repair; the houses dirty, and without ventilation—overcrowded; deficient water-supply; the yards and back lanes saturated with filth of every description. The consequence was, fever was almost altogether confined to the upper portion of the district (Plan B). (I have here to thank the Rev. Mr. Fuller for the assistance he gave me in completing the plans for the whole city, and having them lithographed.) These evils were concentrated in Hilliger Street; and at one time there were 17 cases of fever in this street alone; but when a granite gutter was laid down the centre of the lower half, instead of the rough paved drain, the fever rapidly disappeared. There was fever in a few houses of the lower portion of the district, but defective drainage and neglect of sanitary laws were the cause in each place. As to the character of the fever that came under my care, the cases were all continued fever, of greater or less severity; the great majority were very mild. I did not meet with a single case of either typhus or typhoid fever in the 388 cases of fever. I had altogether 501 cases of sick under my care, but there were many who suffered from other diseases, such as affections of the lungs, dysentery, and infantile diseases, for the most part the sequelæ of fever. The mortality was very low, and principally confined to the infants and aged; for out of 24 fatal cases of fever, 12 were above 50 years of age (I might say 60 years). The total deaths in the district were 28: of these, 24 were of fever, 2 of croup, 1 of dysentery, and 1 of aneurism of the abdominal aorta. The ages were—under 1 year, 4; from 1 to 10 years, 3; from 10 to 50 years, 7; and over 50 years, 14 deaths. The fevers in the 7 cases were characterised by the intense and persistent headache, the great tendency to prostration, and occasional deafness. Delirium was not frequent; a pulse quick and weak; skin hot and dry; tongue thickly coated with fur, and white, seldom getting brown; bowels generally confined; no petechiæ or rash of any kind—in fact, a low, nervous type. In some cases, congestion of the lungs, more especially in the old, in whom there appeared to be a passive congestion, arising from utter prostration of the vital powers. Case No. 16 is a very good specimen of the severer cases. I had only one case of parotid abscess. The average duration of each case, I should think, was about 10 days; generally the fever left on the 7th day, and then convalescence was very rapid. The treatment was very simple. The principle was to support the strength from the first, and meet symptoms or changes as they might occur. Liq. ammon., acet., brandy, wine, soup, and bread were the sheet anchors; valerian when the headache was severe; counter-irritation in cases of passive congestion of the lungs; expectorants, &c. I found quinine in the early stages decidedly injurious, and gave it simply as a tonic in convalescence, in 1 gr. or ½ gr. doses.

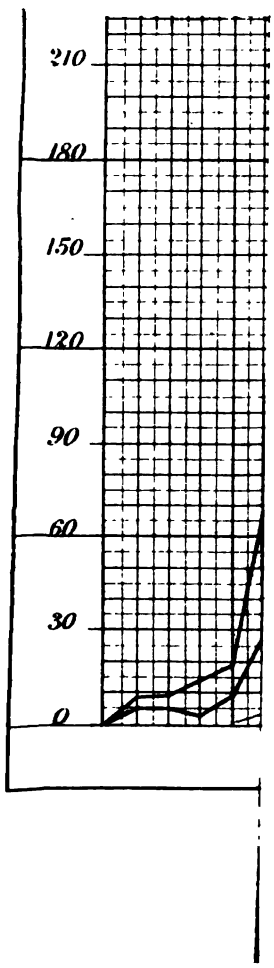
Seldom seeing a case on the first accession of the fever, I found it much better to let the bowels continue constipated for a few days, than to administer a purgative, which had a very depressing effect on patients already reduced by starvation to a very low state of vitality.

Other medical men having reported cases of typhus or typhoid fevers in their districts, I anxiously looked for such cases amongst mine, but did not meet with any. I do not for a moment deny that there were cases of typhus and typhoid or pythogenic fever. In districts 11 and 12, from whence the epidemic first radiated, there were all the elements for the production of putrid or pythogenic fever. Houses built over the Capel Ditch, which is simply a ravine filled up with the filth and sweepings of the town; deficient water supply, and principally from wells in the immediate neighbourhood of cess-


40
30
20
10
New Cases
Deaths 0

ES. Diagram F

1868


210
180
150
120
90
60
30
0

pits; and it was from this locality the case of typhus was contracted that introduced it into Stellenbosch. From hence also the majority of the soldiers contracted fever, as well as other diseases.

Taking all these circumstances into consideration, I cannot resist the conclusion that the late epidemic was preventible by the adoption of proper sanitary measures; that the sources of disease had been long accumulating, and that it needed only the passing of the pandemic wave across us to develope it; that it derived its peculiar character and types from starvation, overcrowding, and dirt. It was very amenable to treatment, and disappeared as soon as active sanitary measures were adopted: therefore, to prevent its recurrence, a much increased water supply, improved drainage, and an intelligent sanitary supervision of the city are required.

The following Meteorological Returns have been kindly furnished by Sir Thomas Maclean, the Astronomer Royal, from observations taken at the Royal Observatory.

Meteorological Register for July 1867, Deduced from five Observations Daily. Hours of Observation 1h., 5h., 9h., 17h., and 21h., Cape Mean Time. Height above the Sea Level, 27 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers.				Dew Point.	Humidity of Air. Sat. = 100.	Barometer, Minus Tension.	Wind.		Rain in Inches.	Cloudy Sky in Tenths.
		Dry.	Wet.	Maximum.	Minimum.				Hourly Velocity.	Direction.		
July.	inches.	°	°	°	°	°	°	inches.	miles.			
1	30·228	56·06	51·18	64·0	48·7	46·42	71·8	29·911	7·63	S. by E.	...	4·0
2	30·164	60·08	53·42	67·7	50·7	47·26	65·2	·835	4·13	S. E. ½ S.	...	3·4
3	30·139	58·56	52·74	71·8	49·8	47·58	68·4	·808	4·29	S.E.	...	3·3
4	30·154	59·00	55·46	69·0	49·0	52·36	79·4	·759	2·50	S. by E. ½ E.	...	5·0
5	30·161	63·62	57·86	71·9	57·8	52·84	69·4	·761	9·04	S.S.W. ½ W.	...	0·9
6	30·130	61·82	56·50	72·5	55·0	52·02	71·4	·740	6·00	S.W. ½ S.	...	7·2
7	30·206	55·94	53·94	61·8	50·0	52·10	87·8	·816	7·00	N.W. by N.	...	4·7
8	30·246	53·80	51·50	59·7	44·8	49·16	85·0	·894	4·54	W.S.W.	...	2·6
9	30·141	60·38	53·44	67·7	55·0	47·06	63·2	·816	4·50	N.W. by W.	...	4·4
10	30·052	58·88	51·62	70·2	51·2	45·40	63·8	·746	7·25	N.W. ½ N.	...	6·3
11	29·908	57·96	53·04	64·6	52·6	48·50	71·8	·566	4·38	N.W. by N.	...	10·0
12	29·740	56·40	51·64	61·0	49·2	47·12	71·4	·414	21·71	N.W. ½ W.	0·768	8·6
13	30·009	53·36	50·52	58·0	47·8	47·74	81·6	·677	9·83	S.W.	1·065	7·8
14	30·252	54·04	51·20	59·5	49·3	48·38	82·2	·912	4·58	N.W. ½ W.	...	5·0
15	·991	52·10	48·50	59·0	43·4	45·00	77·8	·691	3·46	W. by N. ½ N.	...	0·6
16	·919	54·52	51·66	58·2	46·3	48·70	81·2	·575	7·75	N.W. by W.	0·528	6·5
17	30·073	50·90	47·54	57·5	44·0	44·00	78·4	·785	2·46	S.W.	0·133	8·3
18	30·116	52·58	49·44	54·0	49·0	46·14	79·4	·801	11·96	N.W. ½ N.	0·225	6·9
19	30·121	54·06	50·76	58·7	49·8	47·54	79·0	·790	8·25	W. by S. ½ S.	0·266	9·3
20	30·230	53·06	50·46	57·8	47·6	47·86	83·0	·896	4·17	S.W. by S.	...	4·3
21	30·151	52·06	49·50	59·0	45·0	46·96	83·8	·828	3·54	S.W. by W.	...	2·9
22	30·336	54·80	53·62	59·3	51·6	52·46	92·0	·941	3·13	N.W. by N.	0·168	8·4
23	30·205	55·24	54·12	58·8	52·5	53·00	92·6	·802	3·38	N.N.W. ½ W.	0·152	7·6
24	30·037	57·36	56·76	58·7	53·6	56·18	96·0	·585	7·50	N.W. by N.	0·765	9·8
25	30·104	57·06	53·30	61·2	54·1	49·84	77·2	·743	7·67	W.	0·273	9·1
26	30·293	55·60	52·18	61·2	49·7	48·88	78·8	·946	6·21	N.W.	...	6·9
27	30·298	56·38	53·66	62·5	47·4	50·98	82·8	·923	6·79	S. by E. ½ E.	...	3·4
28	30·115	58·80	53·52	71·1	50·5	48·88	70·6	·766	4·13	S.	...	0·4
29	30·062	63·34	56·74	74·2	57·2	51·40	68·0	·680	7·04	W. by S.	...	0·8
30	30·265	57·12	53·38	63·5	54·2	49·82	76·8	·905	19·58	S. ½ W.	...	5·8
31	30·287	54·64	49·56	58·2	50·5	44·50	69·2	29·993	14·79	S. ½ W.	...	6·2
											Sum.	
Means.	30·133	54·44	52·54	63·0	50·2	48·91	77·4	29·778	7·07	W. by S. ½ S.	4·343	5·6

Mean Results for the several Hours of Observation.

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit	30·121	30·115	30·143	30·128	30·160	30·367	29·687
Pressure of dry air	29·751	29·754	29·773	29·804	29·806	30·044	29·298
Thermometer, dry	61·49	58·09	54·83	52·56	55·21	73·5	45·2
,, wet	55·56	53·75	51·38	49·72	52·30	62·0	44·0
Humidity of the air per cent.	69·0	75·0	76·6	82·0	82·4	99·0	36·0
Dew point	50·52	49·82	48·03	46·84	46·32	56·8	39·8

METEOROLOGICAL Register for August 1867, deduced from five Observations Daily. Hours of Observation, 1 h., 5 h., 9 h., 17 h., and 21h., Cape Mean Time. Height above the Sea Level, 37 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers.				Dew Point.	Humidity of Air. Sat. = 100	Barometer, Minus Tension	Wind.		Rain in Inches.	Cloudy Sky in Tenths.
		Dry.	Wet.	Maximum.	Minimum.				Hourly Velocity.	Direction.		
August.	inches.	°	°	°	°	°	°	inches.	miles.			
1	30·388	52·92	49·16	58·1	47·5	45·38	77·0	30·084	4·38	S. by W.	0·085	4·8
2	30·388	54·84	49·96	59·0	50·0	45·00	70·4	30·089	10·46	S.S.W.	...	0·7
3	30·214	56·30	51·30	61·1	47·9	46·64	70·6	29·895	13·25	S.	...	1·8
4	30·047	60·42	55·36	70·0	53·7	50·96	72·0	29·673	4·04	S.W. ½ S.	...	4·4
5	30·135	60·22	57·86	62·7	57·0	55·64	85·8	29·691	9·33	S.W. ½ W.	...	1·4
6	30·040	57·92	54·34	64·8	48·7	51·04	79·0	29·663	10·17	S.	...	0·3
7	29·883	57·70	55·60	65·4	52·8	53·68	87·2	29·469	2·46	W.	...	6·1
8	29·812	55·64	53·28	63·0	53·5	50·92	84·6	29·436	10·92	N.N.W.	0·035	9·9
9	29·883	53·74	50·98	57·6	49·9	48·08	81·8	29·545	10·08	N.W. by W.	0·502	7·0
10	30·109	54·46	49·84	59·4	50·2	45·40	72·0	29·805	9·29	S.S.E	...	1·9
11	30·117	54·68	50·30	58·0	52·1	45·94	73·2	29·806	16·04	S. ½ W.	...	4·8
12	30·126	57·32	54·24	60·7	54·2	51·34	81·2	29·746	16·33	S. ½ E.	...	4·0
13	30·322	58·88	55·28	64·0	55·0	52·00	78·8	29·934	10·96	S. ½ E.	...	4·0
14	30·382	56·52	51·66	61·0	52·1	46·96	71·2	30·057	16·54	S.	...	2·3
15	30·367	58·58	51·64	63·2	52·7	45·42	62·0	30·062	15·04	S.W. ½ S.	...	0·1
16	30·333	56·92	51·84	66·7	45·1	47·30	72·4	20·003	6·71	S. ½ E.	...	0·0
17	30·207	60·92	52·80	70·4	48·0	45·88	59·2	29·895	5·75	S.S.W.	...	1·3
18	30·103	60·34	53·10	74·8	48·0	47·14	64·6	29·779	6·67	N. W. ½ N.	...	2·2
19	30·094	58·50	54·46	68·1	53·6	51·00	78·6	29·717	5·75	N.W. by W.	...	5·2
20	30·206	56·36	54·60	60·1	51·0	52·82	88·4	29·804	3·96	S.W. by W.	0·108	4·9
21	30·114	57·26	53·36	62·8	45·9	49·44	76·0	29·760	9·88	S.	...	0·5
22	29·850	60·00	54·26	70·8	53·5	49·16	71·4	29·497	6·71	W.	...	4·2
23	30·071	53·06	47·70	60·7	44·4	42·08	67·6	29·802	5·50	S. ½ W.	0·270	3·1
24	30·248	52·20	46·40	54·3	47·1	40·52	64·8	29·995	13·88	S. by E. ½ E.	0·010	3·2
25	30·032	56·32	49·86	60·9	52·8	43·86	63·3	29·744	22·17	S.S.E.	...	3·1
26	30·126	55·46	53·24	59·2	52·0	51·06	85·8	29·751	9·17	S.W. ½ W.	0·156	9·2
27	30·250	55·76	54·40	61·0	49·0	53·08	91·2	29·845	6·33	N.W. by W. ½ W.	0·010	6·2
28	30·180	55·52	51·86	64·3	43·9	48·50	79·0	29·837	3·67	N.W. ½ W.	...	0·3
29	30·056	56·38	52·84	66·1	46·7	49·56	80·2	29·700	4·04	S.W. by S.	0·010	1·8
30	29·977	57·36	54·10	63·6	53·3	51·02	80·2	29·602	9·04	N.W.	0·042	4·7
31	30·069	55·54	54·12	62·5	51·5	52·76	90·6	29·668	7·13	N.W. ½ W.	0·130	5·6
											Sum.	
Means.	30·133	56·71	52·57	63·0	50·4	48·70	76·1	29·786	9·21	S.W. ½ W.	1·358	3·5

Mean Results for the several Hours of Observation,

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit	30·122	30·157	30·147	30·113	30·156	30·476	29·750
Pressure of dry air	29·764	29·757	29·800	29·802	29·805	30·135	29·397
Thermometer, dry	61·88	58·11	54·65	52·24	56·67	74·2	45·8
,, wet	55·15	53·65	51·66	49·56	52·85	59·5	42·2
Humidity of the air per cent.	65·7	74·2	81·0	82·5	77·5	99·0	36·0
Dew point	49·45	49·59	48·69	48·76	48·99	57·4	37·2

METEOROLOGICAL Register for September 1867, deduced from five Observations Daily. Hours of Observation, 1 h., 5 h., 9 h., 17 h., and 21 h., Cape Mean Time. Height above the Sea Level, 87 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers.				Dew Point	Humidity of Air. Sat. = 100.	Barometer, Minus Tension.	Wind.		Rain in Inches.	Cloudy Sky in Tenths.
		Dry.	Wet.	Maximum.	Minimum.				Hourly Velocity.	Direction.		
September.	inches.	°	°	°	°	°	°	inches.	miles.			
1	30·116	56·38	52·46	60·0	53·0	48·66	76·0	29·771	10·33	N.W. by W.	0·525	8·2
2	30·484	51·66	46·10	58·3	46·1	40·32	66·0	30·233	8·08	S. ¼ W.	0·015	4·0
3	30·535	53·36	47·80	57·2	49·2	42·16	66·4	30·266	14·13	S. by E.	...	0·9
4	30·405	55·22	48·42	58·8	49·0	41·86	61·0	30·139	16·13	S. ¼ E.	...	0·6
5	30·204	57·24	51·40	63·3	48·3	46·00	67·4	29·893	15·13	S. ¼ W.	...	3·7
6	30·151	60·34	52·58	64·8	54·2	45·60	59·2	·843	20·54	S. ¼ W.	...	0·2
7	29·962	64·08	54·50	73·0	55·0	46·74	54·8	·642	6·96	S.S.W.	...	6·4
8	29·866	61·08	57·00	74·0	54·2	53·72	79·2	·453	9·54	N.W.	0·073	9·6
9	30·023	56·36	55·14	61·0	54·2	53·92	92·0	·506	8·71	N.W. by W.	0·200	9·0
10	30·083	56·02	52·24	60·3	51·2	48·54	76·8	·738	8·75	W. by N.	0·408	7·7
11	30·262	55·02	50·52	61·0	46·5	46·12	73·8	·949	4·33	S. by E.	...	4·8
12	30·118	54·74	50·78	60·2	49·8	46·94	75·8	·795	11·13	S.W. by W.	...	4·7
13	30·193	56·12	52·34	62·2	51·0	48·92	77·8	·846	4·58	W. by N.	0·068	6·6
14	30·305	56·54	53·94	62·4	48·0	51·58	84·2	·922	5·08	S.S.W.	...	5·4
15	30·228	56·84	51·50	62·4	49·3	46·54	68·8	·910	11·32	S.	...	0·1
16	30·113	60·22	53·08	64·0	53·7	46·76	61·8	·793	15·71	S. ¼ W.	...	1·1
17	30·104	60·34	55·08	66·1	55·0	50·40	71·0	·738	24·04	S.	...	2·0
18	30·236	57·96	51·90	62·8	52·3	46·34	65·8	·921	22·29	S.	...	2·2
19	30·117	62·66	54·48	71·2	49·0	47·60	60·2	·788	10·33	S. by E.	...	0·2
20	30·061	64·16	54·54	79·0	49·0	46·78	57·6	·759	5·08	S. by W. ¼ W.	...	2·8
21	30·059	62·92	58·04	69·0	49·1	53·90	73·8	·844	8·33	S.S.E. ¼ S.	...	1·7
22	30·000	65·60	59·60	83·6	52·9	54·84	72·4	·867	6·17	W. by S.	...	2·3
23	30·048	62·72	59·70	69·9	56·2	57·18	82·8	·880	3·96	S.W. by W.	...	8·2
24	30·015	61·66	57·40	70·0	50·0	53·92	76·6	·801	4·38	S.W. by W.	...	5·2
25	30·090	56·16	51·10	65·0	46·0	46·24	70·0	·773	5·63	S.W.	0·056	6·7
26	30·228	53·92	50·14	60·8	45·6	46·40	76·6	·912	2·13	S.	0·042	3·8
27	30·250	57·14	49·98	61·9	51·9	43·44	60·8	·988	16·83	S. ¼ E.	...	0·9
28	30·093	60·42	52·96	68·3	54·4	46·54	61·2	·775	16·04	S.	...	0·1
29	29·875	60·96	54·78	73·5	50·4	49·64	69·4	·517	4·63	S.W. ¼ S.	...	4·7
30	29·837	58·96	53·70	66·9	52·0	48·82	69·8	29·586	6·04	W.	0·054	6·3
											Sum.	
Means.	30·139	58·56	53·11	65·7	50·9	48·21	70·3	29·798	10·33	S. W. by S.	1·441	4·0

Mean Results for the several Hours of Observation.

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit	30·129	30·125	30·157	30·127	30·159	30·639	29·795
Pressure of dry air	29·778	29·774	29·818	29·802	29·815	30·286	29·939
Thermometer, dry	64·20	60·10	55·72	53·05	59·74	78·5	46·8
,, wet	55·81	54·18	51·90	49·26	53·79	63·0	42·0
Humidity of the air per cent.	59·4	67·7	78·4	80·5	67·5	97·0	35·0
Dew point	46·90	45·97	48·07	46·83	46·26	58·3	36·4

Meteorological Register for October 1867, deduced from five Observations Daily. Hours of Observation, 1h., 5h., 9h., 17h., and 21 h., Cape Mean Time. Height above the Sea Level, 37 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers. Dry.	Wet.	Maximum.	Minimum.	Dew Point.	Humidity of Air. Sat. = 100.	Barometer, Minus Tension.	Wind. Hourly Velocity.	Direction.	Rain in inches.	Cloudy Sky in Tenths.
October.	inches.	°	°	°	°	°		inches.	miles.			
1	30·175	51·74	47·08	60·1	46·6	42·20	70·8	29·905	8·54	S. by W.	0·100	4·6
2	30·277	55·72	50·44	62·6	46·0	45·54	70·0	·971	5·25	S.W.	...	7·7
3	30·148	58·40	54·80	62·3	55·9	51·56	79·9	·764	9·08	N.W. by W.	0·625	6·6
4	30·020	58·16	57·46	61·1	55·3	56·76	95·4	·558	5·29	N.W. by W.	0·360	9·6
5	30·006	59·14	56·60	64·9	53·2	54·26	84·2	·582	6·92	W. ½ N.	0·264	8·3
6	30·142	58·46	53·84	63·0	54·1	49·68	74·2	·783	4·71	W. ½ N.	0·095	7·8
7	30·159	58·12	52·50	63·0	50·7	47·38	68·4	·831	5·00	S.S.W.	...	4·0
8	30·009	60·12	54·96	64·6	55·8	50·30	71·0	·644	13·54	S. ½ E.	...	0·5
9	29·995	59·70	55·10	66·3	51·6	51·12	74·2	·618	4·79	S.S.W.	...	4·3
10	29·984	59·84	56·32	66·1	52·6	53·24	80·0	·578	6·29	N.W. by W.	...	4·2
11	29·931	60·34	54·80	65·5	55·0	49·86	68·8	·869	11·67	W.N.W.	0·382	6·0
12	30·229	57·08	52·62	61·6	51·6	48·58	74·4	·886	4·67	W. ½ N.	0·010	7·7
13	30·153	60·10	55·42	66·0	52·5	51·28	73·8	·773	7·38	S.W. ½ S.	...	2·6
14	29·943	60·80	56·10	70·8	49·8	52·14	75·4	·551	4·00	W.S.W.	...	3·5
15	30·034	60·76	57·54	66·8	50·0	54·68	81·4	·605	8·75	W. by S.	0·275	7·8
16	30·192	59·18	51·82	64·2	54·1	45·06	60·4	·891	15·38	S.	...	2·0
17	30·126	61·90	54·64	71·0	50·0	48·40	63·8	·784	6·50	S. by W. ½ W.	...	3·1
18	30·006	64·92	57·50	77·2	52·3	51·68	66·4	·618	4·17	W. by S.	...	7·5
19	30·050	60·58	52·96	68·3	56·0	46·34	60·2	·735	5·29	S. by W. ½ W.	...	6·2
20	30·159	58·66	51·62	64·2	54·0	45·28	61·8	·856	10·21	S. by E.	...	7·8
21	30·195	59·96	52·50	64·4	54·1	45·92	60·6	·885	18·67	S. by E.	...	0·7
22	30·103	62·88	56·86	68·8	57·2	51·74	67·8	·718	19·96	S. ½ W.	...	1·6
23	29·995	63·36	57·96	69·0	57·5	53·14	70·0	·590	19·63	S.	...	2·0
24	29·939	66·44	61·26	74·0	61·3	57·04	72·4	·473	24·29	S. ½ W.	...	2·6
25	29·914	67·86	62·60	74·2	63·3	58·42	72·4	·425	14·83	S.S.W.	...	8·5
26	29·875	66·38	62·44	76·0	62·0	59·36	78·0	·368	14·54	S. by W. ½ W.	...	7·7
27	29·882	61·30	57·84	68·2	56·0	54·80	80·2	·451	21·29	S. ½ E.	0·675	9·8
28	30·014	59·72	55·78	64·4	55·8	52·24	76·8	·621	18·58	S.	...	6·7
29	30·180	60·08	54·06	64·8	54·8	48·70	66·4	·836	21·25	S. by E.	...	1·6
30	30·104	59·80	55·30	66·0	55·8	51·28	74·8	·726	22·08	S.	0·210	3·4
31	30·268	56·84	51·90	62·5	53·0	47·32	71·8	29·940	15·83	S.S.E.	0·530	4·4
											Sum.	
Means.	30·071	60·27	55·25	66·5	54·1	50·82	72·5	29·682	11·56	S.W. ½ S.	3·526	5·2

Mean Results for the several Hours of Observation.

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit	30·063	30·053	30·081	30·061	30·098	30·387	29·826
Pressure of dry air	29·687	29·676	29·707	29·694	29·644	30·068	29·293
Thermometer, dry	65·03	61·66	57·55	55·78	61·33	75·5	47·0
,, wet	57·14	55·87	53·98	52·90	56·34	66·0	44·0
Humidity of the air per cent.	61·1	68·14	78·4	81·9	72·6	99·0	34·0
Dew point	50·70	50·87	50·67	50·15	51·69	60·2	40·6

Meteorological Register for November 1867, deduced from five Observations Daily. Hours of Observation, 1h., 5h., 9h., 17h., and 21h., Cape Mean Time. Height above the Sea Level, 37 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers.				Dew Point.	Humidity of Air. Sat. = 100.	Barometer, Minus Tension.	Wind.		Rain. in Inches.	Cloudy Sky in Tenths.
		Dry.	Wet.	Maximum.	Minimum.				Hourly Velocity.	Direction.		
November.	inches.	°	°	°	°	°	°	inches.	miles.			
1	30·290	61·18	53·60	64·8	56·2	47·04	60·0	29·966	18·29	S. ½ E.	...	0·2
2	29·994	66·02	58·96	74·0	60·2	53·22	64·2	·588	19·50	S.	...	4·6
3	30·112	63·52	57·84	70·0	58·6	53·06	69·4	·708	17·29	S.S.W.	...	3·3
4	30·080	68·04	59·54	75·0	60·0	52·76	59·0	·680	14·33	S.	...	4·6
5	29·915	67·16	60·58	77·0	55·2	55·40	66·8	·476	7·33	S. by W. ½ W.	...	6·6
6	29·879	65·32	60·46	76·0	55·0	56·62	75·4	·420	8·00	W. by N.	...	3·3
7	29·856	62·18	59·10	74·8	56·3	56·60	84·2	·397	6·83	W. ½ N.	...	8·5
8	29·975	61·92	59·80	68·0	58·3	57·98	88·4	·492	8·83	N. W. by W.	0·155	9·6
9	29·997	58·68	55·48	66·8	50·0	52·60	81·4	·596	7·63	W.N.W	0·038	4·2
10	30·003	60·20	56·28	65·3	56·2	52·80	78·0	·602	10·71	N.W. ½ N.	0·020	7·1
11	30·169	62·68	57·26	68·0	57·5	52·70	71·0	·768	4·79	W. by S.	...	7·4
12	30·146	63·60	55·44	68·6	57·1	48·66	59·0	·803	20·08	S. ½ E.	...	0·8
13	30·080	66·66	58·36	72·7	61·4	51·74	59·6	·694	24·29	S. by W.	...	0·1
14	30·000	72·86	62·76	81·0	63·8	55·20	54·4	·564	16·75	S.	...	0·0
15	29 943	70·16	62·86	84·5	57·9	57·34	66·6	·471	7·83	S.W.	...	0·3
16	29·064	63·68	59·28	76·3	55·0	55·42	76·4	·523	5·79	W. ½ N.	...	5·5
17	29·960	69·62	62·82	76·6	64·0	57·28	66·4	·489	17·13	S. ½ E.	...	3·4
18	29·998	65·52	60·96	73·0	59·0	57·18	75·4	·528	22·88	S. by W.	...	5·8
19	30·114	61·16	54·24	66·4	55·0	48·28	63·6	·774	23·33	S.S.E.	...	3·3
20	30·124	64·40	56·64	72·0	56·0	50·30	62·2	·759	21·29	S.E. by S. ½ S.	...	1·0
21	30·078	65·66	57·48	74·7	59·2	50·80	59·4	·707	20·67	S. by W.	...	0·3
22	29·938	67·80	59·76	81·3	55·0	53·72	64·4	·523	6·88	S. by W. ½ W.	...	2·3
23	29·973	67·06	58·72	78·5	58·3	52·14	59·8	·575	14·42	S. by E. ½ E.	...	6·5
24	30·143	61·68	52·86	67·9	55·0	45·30	56·6	·839	23·42	S. by E.	...	0·4
25	30·056	64·98	55·48	70·8	56·0	47·68	54·8	·724	18·33	S. by W.	...	1·1
26	29·994	68·54	58·58	78·9	59·2	50·80	54·2	·621	17·75	S. ½ W.	...	3·8
27	29·897	65·96	60·04	73·8	59·7	55·24	69·4	·460	16·96	S. by E.	...	3·0
28	29·873	67·88	61·58	84·8	56·2	56·84	71·0	·410	7·33	W. ½ N.	...	6·1
29	30·002	65·46	58·80	68·8	59·5	55·16	70·0	·566	8·38	W.	...	5·9
30	30·016	64·72	56·40	73·8	51·0	49·78	60·8	29·667	4·75	N.W. by W.	...	2·5
											Sum.	
Means.	30·019	65·14	58·43	73·5	57·4	52·99	66·7	29·613	14·06	S.W. by S.	0·213	3·7

Mean Results for the several Hours of Observations.

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit	30·021	29·999	30·035	30·005	30·034	30·359	29·768
Pressure of dry air	29·607	29·581	29·628	29·615	29·633	30·017	29·258
Thermometer, dry	71·79	66·56	61·29	59·11	66·97	83·6	51·2
,, wet	61·36	59·49	56·92	55·29	59·10	69·0	49·2
Humidity of the air per cent.	53 6	64·8	75·3	78·2	61·7	97·	36·
Due points	53·56	53·83	53·09	51·87	52·59	60·0	42·4

METEOROLOGICAL Register for December 1867, deduced from five Observations Daily. Hours of Observation, 1h., 5h., 9h., 17h., and 21h., Cape Mean Time. Height above the Sea Level 37 feet.

1867.	Barometer at 32° Fahrenheit.	Thermometers.				Dew Point.	Humidity of Air. Sat. = 100.	Barometer, Minus Tension.	Wind.		Rain in inches.	Cloudy Sky in Tenths.
		Dry.	Wet.	Maximum.	Minimum.				Hourly Velocity.	Direction.		
December.	inches.	°	°	°	°	°	°	inches.	miles.			
1	30·053	68·38	58·84	76·2	58·5	51·44	56·8	29·670	6·13	S. by W.	..	2·8
2	30·056	66·74	60·26	75·0	60·0	55·14	68·8	·617	6·25	S.W. by W.	0·090	3·9
3	30·034	68·24	60·32	72·0	58·0	55·60	70·6	·590	5·50	W. by S.	0·012	5·4
4	29·993	64·90	61·90	71·0	60·6	59·32	83·6	·487	7·46	N.W. ½ W.	0·050	9·4
5	30·008	67·58	64·42	72·3	60·0	61·84	82·6	·452	6·00	W. by N. ½ N.	0·010	7·8
6	29·983	70·16	64·82	76·7	63·0	60·64	73·0	·453	10·96	S.W.	...	2·8
7	29·843	74·14	66·14	84·0	63·6	60·52	64·4	·314	8·83	S S.W. ½ W.	...	1·4
8	29·815	71·88	65·28	85·5	62·0	60·46	69·0	·288	4·79	W.N.W. ½ N.	0·073	5·0
9	29·981	65·00	59·22	75·3	56·0	54·54	71·0	·552	5·46	S. by W.	0·083	5·5
10	29·965	67·90	57·82	72·0	61·4	49·86	53·4	·606	18·29	S	...	6·6
11	29·794	72·20	61·64	82·8	63·3	53·74	54·2	·379	13·64	S. by W.	...	5·6
12	29·832	68·46	62·80	81·9	60·2	58·58	72·4	·340	9·13	N.W. by W.	...	8·1
13	29·837	67·20	61·98	77·0	60·5	57·94	74·8	·355	10·00	N.W. ½ W.	0·145	4·1
14	30·053	60·86	53·12	70·0	52·0	46·60	61·0	·734	8·25	W. ½ S.	0·010	7·2
15	30·241	63·66	54·92	69·8	57·5	47·54	56·6	·911	10·96	S.S.W. ½ W.	...	5·0
16	30·119	66·98	58·52	74·3	61·3	51·74	59·0	·733	21·67	S. by E.	...	3·2
17	30·059	68·62	61·52	73·0	60·5	55·92	65·0	·610	21·96	S.	...	3·6
18	29·952	72·06	62·06	75·0	63·3	54·40	54·6	·527	22·00	S. ½ E.	...	1·6
19	29·878	72·34	62·76	86·0	62·4	55·72	57·4	·435	16·17	S. by W.	...	0·7
20	29·888	68·74	62·20	79·2	63·0	56·94	67·0	·423	18·88	S.S. W. ½ W	...	1·5
21	29·877	68·06	62·24	78·0	58·0	57·80	71·4	·398	12·67	W.S.W. ½ S.	...	1·5
22	29·964	71·40	64·28	83·0	63·0	59·06	66·8	·462	13·25	S. by E.	...	1·6
23	29·969	72·40	64·50	77·0	64·7	58·54	63·4	·475	24·29	S.	...	3·1
24	29·892	70·98	63·06	81·8	64·5	57·10	61·8	·424	21·50	S.	...	3·0
25	29·851	70·42	64·84	76·3	64·0	60·64	71·6	·319	14·08	S.	0·070	6·5
26	29·816	69·70	64 74	82·0	62·0	61·10	76·0	·277	17·21	S.W. by S.	...	2·9
27	29·823	67·24	63·42	75·5	60·0	60·46	79·6	·296	10·21	S.W. by W.	...	6·4
28	29·827	70·86	64·12	79·0	60·8	59·18	68·2	·324	4·17	W.	...	3·6
29	29·841	69·92	63·80	78·8	62·2	59·32	71·2	·334	7·42	N.W. ½ W.	...	4·2
30	29·989	69·60	60·70	76·1	59·4	55·12	59·6	·553	5·54	S.W. ½ S.	...	2·4
31	30·064	69·00	60·34	75·3	63·2	53·70	59·4	29·651	20·25	S. by E.	...	1·0
											Sum.	
Means.	29·945	68·83	61·83	77·2	60·90	56·47	66·6	29·484	12·45	S.W.	0·543	4·3

Mean Results for the several Hours of Observations.

	1 P.M.	5 P.M.	9 P.M.	5 A.M.	9 A.M.	Highest.	Lowest.
Barometer corrected at 32° Fahrenheit...	29·948	29·920	29·963	29·035	29·960	30·270	29·729
Pressure of dry air	29·489	29·455	29·502	29·482	29·490	29·958	29·226
Thermometer, dry	75·65	71·11	65·09	62·57	69·70	86·0	52·2
,, wet	64·38	62·83	60·36	59·04	62·51	69·8	49·8
Humidity of the air per cent.	51·94	60·86	74·71	80·16	65·32	94·0	33·0
Dew point	56·30	56·52	56·48	56·02	57·02	67·7	43·8

D 2

APPENDIX No. XVI.

MEDICAL HISTORY OF SIERRA LEONE.

By ALBERT A. GORE, M.D., Staff Surgeon.

THE Peninsula of Sierra Leone was first visited by the Portuguese about the year 1480; in the middle of the seventeenth century by the Dutch, under one of the Van Tromps; the English subsequently established themselves upon Bunce Island, in the middle of the river. At the suggestion of Dr. Smeathmane, the negroes discharged from the Army and Navy, after the American War, to the amount of 400, with 60 Europeans, were conveyed to Freetown, furnished with all things necessary to found a colony, in the year 1787, and in latitude 8° 30′ N. and 13° 5′ W. longitude, founded Freetown, the present capital and head-quarters of the West African command. Freetown is situated on the south side of the river, some five miles from its entrance, and built upon an inclined plane, extending to the foot of Tower Hill, which rises to 375 feet above the level of the sea.

Shortly after Freetown was founded, a dreadful mortality reduced the colonists to one-half, and a native chief, taking advantage of their weakness, plundered the settlement in 1789, and drove the colonists again to seek shelter in Bunce Island. In 1791, the African Association became incorporated, and under the auspices of Grenville Sharpe, a number of settlers were conveyed thither, including the Maroons from Nova Scotia. In 1794, Freetown was taken by the French, and so great was the destitution after this event, that the Company transferred their jurisdiction to the Crown. This was finally confirmed in 1808.

The early history of European society in West Africa is nothing but a catalogue of crime, made more hideous by disease, and invariably wound up by rapid death. This at last became so notorious that it called from Theodore Hook the witty sarcasm, that Sierra Leone had always two Governors, one *going out alive*, the other *coming home dead*. Yet the country tolerated to that then grave of horrors the deportation of valuable officers and soldiers, who died miserably under a tropical sun, in a country and climate naturally insalubrious to all but the Aborigines, these living amidst the productions of an ultra-fertile district, and enjoying the munificence of Providence almost without exertion, were at that time very debased, savage, and cruel. The enervating influence of climate, some peculiarity in the species, and the example of dissipated Europeans, prevented their rendering any exertion to make their country more healthy for mere intruders, whose only object was to gain as much as possible from them in the shortest time and by any means, no matter how disreputable. Besides, a nation whose *summum bonum* consisted of contemplative and sensual ease, and who lived in a climate which did not spur them on for mere subsistence, or was not naturally unhealthy for them, could never make great advances in civilization. The Africans were precisely in that predicament, having made for themselves a horizon of happiness beyond which they neither wanted to travel or see. This will ever be the chief reason why Western Africa must remain a *terra inhospita* for those Europeans who venture to reside in it.

The history of the earlier scientific expeditions was quite sufficient, one would imagine, to show the absurdity of keeping white troops in these regions. Mungo Park left the Gambia in April 1805, accompanied by 44 Europeans; by

October all but four had died. In Tuckey's expedition to the Congo, in 1816, in the month of July, out of a crew of 54, 19 were lost from remittents and intermittents. In the same month, Owens went up the Zambesi in 1823; all the Europeans died. In 1827, 25 Marines were landed at Fernando Po; all except one had fever during the next year, and eight died. In the Niger Expedition of 1832 the loss was 39; in that of 1841 and 1842, which took place in August, 42 died out of 142. In all these cases the natives were exempt, with the exception of 11, who had come from England with the Niger Expedition of 1841.

Previous to the year 1816 we have no reliable data as to the sickness and mortality of the white troops serving in Western Africa; but a severe epidemic seems to have occurred in 1815; for in the history of that of 1822, it is remarked that no such fever had been seen since that year. In 1816, the mean average effective of European non-commissioned officers and men amounted to 540: of this number, 115 died, and 32 were invalided. The officers present were 45; of these, six died and six returned to England. In 1817, out of 246, 62 died, 23 were invalided; the officers had fallen to 32, 3 died, 5 were invalided. In May of this year, several cases of yellow fever are mentioned by Copeland, as having occurred amongst the seamen at Sierra Leone; the first authentic notice of this disease in the colony. The garrison appears to have been exempted from the affection. During the two following years the European force appears to have gradually melted away from disease, when the garrison was reduced to the native contingent hitherto associated with it. In 1818, the white troops consisted of a mean average effective of 102; of these, 38 died, 10 were invalided; out of 21 officers, 2 died, 2 were invalided. In 1819, the Europeans had dwindled down to 54; of these, 18 died, and the remainder returned to England. Cholera first appeared at Sierra Leone in this year, three cases having occurred. From this period until 1825 there are no records of an European force. During the five years ending 1824, the black troops averaged a mean annual effective of 524·8, the mortality amongst them was not more than 6·9 per cent., whereas that of the white troops in the same period was 23·4 per cent.

In 1822, occurred the first epidemic of yellow fever at Freetown of which we have any definite account; it appeared there in the commencement of the year, or healthy season, the black population being entirely exempted from the disease; its victims were chiefly those newly arrived from Europe—the robust and plethoric, and the residents. It was not believed contagious, but thought to be a fever *sui generis*, having a regular course and duration, *one febrile accession no remission*, yellowness appearing generally only a few hours before death took place. The symptoms were not those of an active or ardent form. It was ushered in with pains in the loins and limbs, referred particularly to the calves of the legs, head, sometimes the præcordia, occasionally vomiting, tongue white and tremulous, red and clean or black, no great heat apparently felt, but a stinging heat was communicated to the hand when the limb was firmly grasped, the pulse hurried and full, eyes suffused, anxiety, &c. In the first stage, lasting about 38 hours, a thin dark fluid passed through the alimentary canal, containing small floating flocculi, not unlike broken-down and unwashed blood fibrine. The patient at this time felt relieved. This stage was followed by a morbid torpidity, or low delirium. On the 4th day black vomit appeared, at first with ingesta, afterwards in large volumes, ejected with great and spasmodic force. The fluid was like diluted and broken-down coagulum; there was sometimes hiccough. When this symptom was present, the vomiting was less frequent. Dissolution was occasionally preceded by violent straining of the eyeballs, incoherent expressions, and dingy yellow colour of the head and neck.

The fever was supposed to arise at this time from inflammation of the villous coat of the stomach and intestines. The intestinal canal was found inflamed, the gall bladder much distended with bile and glairy mucus. This epidemic prevailed most along the coast, and females and children were entirely exempted. Its origin was involved in obscurity. The first suspicious case had occurred on the 15th of December in the former year; the captain of a merchant vessel, aged 34 years, who had fallen ill after having piloted the "Ranger" into harbour. This individual had first green, afterwards black

vomit; he died on the 20th, five days after having been attacked. The "Ranger" had been loading with timber in the river. The crews of these vessels were very unhealthy, many dying of remittent fever. On the 22nd of February the first case was admitted from on board the "Caroline," a sailor. Many of this class had died about the same time at Freetown. In April, the fever began to attack the European residents, pursuing its fatal course during May and June. Ten days before the case had been admitted from the "Caroline," one had occurred on board the "Lively," another timber vessel; this ended fatally. The "Lively" and "Caroline" were both lying together in harbour. The "Caroline" had recently arrived from Gibraltar. During the voyage the crew had enjoyed good health. Yellow fever had prevailed in the south of Spain from 1819 to 1821, with varying intensity. About this time an American vessel of war, the "Cayenne," had arrived from the West Indies; while off the Spanish Main she had had several cases of fever on board.

The rains had been lighter than usual, and the tornadoes which followed less severe. The Harmattans were very mild, with very little lightning; there was the usual heat, but more moisture in the air. During the tornadoes the fever continued unabated. On the 12th of June the last fatal case occurred. The heavy periodical rains had now set in; they had the effect of arresting the disease. In July the weather cleared up, when a case appeared in the person of a Missionary, who lived close to the river. He had attended his brother, who died on the 16th of April. This individual died on the 20th of July. On the 26th of April and 3rd of May two gentlemen, slightly indisposed, embarked on board two merchant vessels; both died the fifth day after embarking. The disease was not communicated to the passengers or crew of either vessel. When the rains recommenced, the fever changed its type into that of the ordinary remittents. This epidemic was confined to the lower part of the town, and the individual cases arose at points having no connection between them. In this year the mean average effective of the officers was 37; of these, four died and three were invalided. The mortality among the officers of the squadron gave a ratio of 63 per thousand.

In 1823, the millesimal ratio of deaths had risen to 302. Amongst the officers of the squadron, out of 41 Europeans attached to the garrison, 10 died and eight were invalided. In March of this year three vessels of the Royal Navy were at anchor in the harbour of Sierra Leone; their crews were very unhealthy, chiefly from the common remittents. The "Bann," one of them, had least sickness on board. The others sailed to leeward, when their crews recovered without any appearance of black vomit having presented itself. The "Caroline," mentioned in the History of the Epidemics, had the reputation of being exceedingly dirty and unhealthy; many of her Kroomen had died, the only natives attacked. The only death which occurred on the hills had been contracted in Freetown. During the epidemic many had died of severe remittent fever, without black vomit, and many deaths had also taken place before the epidemic appeared. It was observed of this fever, that in no case could the salivary glands be subjected to the influence of mercury; no case recovered after black vomit showed itself, and only one after dark fluid had passed from the bowels. Although those who escaped had been easily vesicated, many under a similar treatment died. The "Bann," although having least sickness on board, was still very unhealthy; the first case of fever appeared after she had been joined by her tender, the "Raphael"; the latter had just come from Galinos; one of her sailors died before she arrived alongside the "Bann." The "Bann" sailed for Ascension from Sierra Leone, and arrived there on the 25th of April. During her voyage the fever had committed frightful ravages, 32 men having died. Her Majesty's ship "Driver," healthy at the time, arrived off the island seven days after the "Bann," 2nd of May. The sick of the "Bann" were encamped in tents on shore, and isolated as much as possible from the men of the "Driver" and garrison. In a few days an Admiralty clerk, captain, and servant, who were sent on board the "Bann," were seized with fever. On the 11th of May it broke out in the garrison, in the family of a soldier, whose wife had been washing for one of the "Bann." The fever first attacked her child, then herself. In two months 15 out of 35 officers and men, and 6 out of 17 women and children, residing upon the

island, died. Of the Kroomen on board the "Bann," many suffered from fever, but none of them had died. The fever was of a less severe form from that which attacked the white sailors.

Of this fever, apparently imported from Sierra Leone, it was noticed that when ptyalism occurred it was a favourable sign, although many recovered without the mouth having been affected; before death there was coffee-ground vomit and the skin assumed a more or less yellow colour. The post-mortem appearances observed were, in some a turgescence of the membranes of the brain, with a little fluid in the ventricles; the coronary vessels of the heart were turgid and black, as also those on serous membrane of pericardium. The omentum was turgid from increased vascularity; the liver slightly larger, the gall bladder contained generally a small quantity of healthy bile, the stomach in all cases contained a similar fluid to that which had been vomited before death; it bore marks of recent inflammation, with glairy mucus, and sometimes thickening of pylorus. In the intestines were spots of inflammation, mucous coat destroyed, having at these parts the dark-coloured fluid. In such cases the mesentery was very vascular; the colon was sometimes contracted, in parts pale.

In 1824 the mean average effective was 738, principally blacks; of these, 136 died (including 42 killed in action); of 44 officers, 28 died and nine were invalided. The mortality this year were principally due to the Ashantee war, during which the force underwent great privations. In this expedition, the Governor-in-Chief, Brigadier-General M'Carthy, lost his life. From this time until 1834, Sierra Leone boasted of no less than nine different Governors—Major-Generals Turner and Sir Niel Campbell, Colonel Denham, Lieut.-Colonel Lumley, Major Ricketts, Colonel Findley, Mr. Temple, and Major Campbell.

In 1825 a large number of white troops was sent to Sierra Leone to form the Royal African Corps. This regiment consisted of 20 officers and 511 non-commissioned officers and men; it was recruited from soldiers whose punishment had been commuted in England. They were extremely dissipated, unmanageable, and insubordinate. They were crowded into sheds at the base of Tower Hill, barracks scarcely affording protection from the weather; their rations principally consisted of salt pork and beef. A detachment of this corps, while at anchor at the Gambia, *en route* to Sierra Leone, consisting of 91 men, lost in three months 73 of their number, or 65·17 per cent. Of 50 native soldiers, not one died during this interval. At Freetown, while the residents were tolerably healthy, the crews of the timber vessels lying in the harbour suffered severely from remittent fever; as did also the European officers and men, the mortality of the former being in the ratio of 275 per 1,000; that of the latter 679·5. Out of 62 officers on the coast, 15 died and eight were invalided; the millesimal ratio in the squadron was only 61·8. The greatest mortality and sickness occurred in the third quarter of this year; the deaths to cases treated at Freetown was in the proportion of 1 to 2·73; whereas at the Isles de Los, 60 miles to the north of Sierra Leone, it was only 1 to 7·00. This difference was accounted for from the fact that a better and younger class of men had been detached to these islands. The 9th Company were detained on board a transport in harbour, owing to want of room in barracks from February until August, during which period no deaths took place; after being disembarked many sickened and died. A green tongue was considered a very unfavourable sign in this fever; the dejections were at first natural, but afterwards were always dark, sometimes black and pitchy, at other times green. There was suppression of urine, which, when not suppressed, caused scalding on being voided. The occurrence of yellow suffusion was a certain fatal sign amongst the soldiers in hospital; there was occasional bleeding from the gums, but no coffee-ground vomit.

The year 1826 was again very unhealthy, principally from remittent fever, which was peculiar, in some cases, in exhibiting no cold stage, but degenerating into a hectic condition. The Isles de Los were also very unhealthy: out of 108 recruits, not commuted men, who occupied it, 48 died, 50 were invalided, and only 10 remained fit for duty. These islands are well surrounded by sea, and consist of a bed of granite, with very little vegetation on their surface. The millesimal ratio of deaths was 632·7 for the men, 400 for the officers, 24 dying and 14 being invalided from among 55 of the latter; that of the squadron

on the coast was only 54·7. In 1827, when the number of Europeans had decreased, and the black troops were augmented, a corresponding decrease of mortality took place, the ratio per 1,000 of deaths for the men being 98·6, for the officers 233, 12 dying and 8 being invalided out of 55; that of the squadron was 41·9; but there were 1,042 admissions to hospital from amongst the Europeans, who averaged 345·5; the treated to strength being in the proportion, in the blacks of 1·05 to 1, in the whites 3·05 to 1; the mortality in the black troops 1 to 15·94, in the white 1 to 6·91. There was no fresh importation of European troops into Sierra Leone this year, and the mortality among the black troops was chiefly from variola. An isolated case of black vomit occurred among the European force, in September of this year. In 1828 the average annual strength of Europeans was 231·75; of these 10 died. The small mortality was probably due to the troops being removed to airy and elevated barracks on Tower Hill, although these buildings were occupied before they were finished or plastered. These barracks were commenced in 1825, at an elevation above the sea of 395 feet, upon the summit of an isolated hill, lying to the sea face, and in the hollow of the semicircle made by the Sierra Leone mountains to the rear. Fresh provisions were now substituted for the old salt ration. The mortality among the officers was reduced to 89·, that of the men being in the ratio of 25·9 per 1,000, while the millesimal ratio in the squadron was 84·6, double what it had been the previous year. The year 1828 was considered healthy and mild. On the 10th of July 14·10 inches of rain fell, on the 11th 10·5 inches, on the 23rd of August 16 inches, during the next 24 hours 8 inches.

In 1829 the ratio of mortality among the squadron, troops, and officers on the coast was much increased, being in the millesimal ratio of 255·1, 70·2, and 161· respectively. The European force at Sierra Leone consisted of 114 men; the proportion of sick treated from this number was 296·; the deaths to strength being in the proportion, in the blacks of 1 to 37·46, whites 1 to 10·36. The fever at Freetown assumed the appearance of an epidemic during May and June. When it commenced, the air had been stagnant, the tornadoes were less severe than usual, the general direction of the wind being from the east. In no instance was the fever communicated to the hospital assistants; it was less malignant in proportion to the prevalence of rain with a sea-breeze or westerly wind. The disease was chiefly confined to the lower streets of Freetown, the shipping in the harbour and the rivers. The chief symptoms complained of were pains in the loins, calves, and forehead. In several there was a diminished temperature, with torpidity of the circulatory system; the tongue was covered with an ash-coloured fur, sometimes preternaturally red; the eyes were watery and suffused. On the 4th and 5th day the skin assumed a dusky yellow tinge; there was great irritability of the stomach; and as the fever advanced, black vomit, like decomposed blood serum, appeared, followed by delusive ideas of feeling better just before death occurred. The *post-mortem* appearances observed were yellowness of the skin: omentum very vascular; external surface of the stomach and intestines highly inflamed; the mucus in some cases resembling false membrane, shreds of which, with grumous matter, filled the intestines; the liver was enlarged, mottled, and distended with much black blood; gall-bladder usually empty; there was great determination of blood to the brain; the sinusus were distended with venous blood; the membranes were very vascular; the ventricles distended with serum; brain substance firm. Unless where free ptyalism took place, no case recovered. Those in barracks were much healthier than the residents occupying the town in this epidemic. Intermittent fever seems to have prevailed to a great extent.

During the quarter ending the 31st December, 48 cases were admitted into hospital from Her Majesty's ship "Plumper." Her crew had been on boat service up the Rio Pongas, a river surrounded by low alluvial mangrove swamps. The remittent fever for which they were admitted was peculiar in the great pain referred to the spine; 24 of those attacked died; the skin assumed a dirty leaden hue; towards the end, bad diarrhœa set in, the abdomen being chiefly involved. *Post-mortem* examination revealed a highly vascular state of the stomach; the mucous membrane of the small intestines was chalk-coloured, in some cases distinctly ulcerated; the large intestine was much inflamed, brown, spongy and fungous, ulcerated, coat thickened; calibre of the

gut diminished. The liver was larger than usual, and the gall-bladder distended with black viscid bile; the spleen was enlarged, softened, and easily lacerated. In many cases, in spite of all measures, the system could not be got under the influence of mercury; even when distinctly under its influence, the symptoms were not alleviated. The saliva flowed with difficulty, but it did flow in a proportion of those who recovered. It was remarked that salivation in some cases came on during the remission, but stopped when the exacerbation returned. Those cases of fever contracted on the margins of the swamps were generally more virulent than those originating in the more open parts. Quinine was found most useful when a remission took place.

In 1830 the white troops were removed from the coast of Africa, when there was at once a corresponding decrease in the mortality, except among the officers and squadron. In the former the millesimal ratio of deaths was still high (125), in the latter 107·9. Out of an annual average effective of 302·75 black troops, 218 cases were treated in the hospital, and only 5 died, or 1 to 60·55. It therefore appears that while endeavouring to garrison a highly malarious settlement with white troops, we had a large ratio of admissions and deaths: of the former, on the coast of Africa, 2978· per 1,000 annually, of the latter 483·. Among the civil population, during the same period, about 17 per cent. died. This system is still kept up by the French: they have a force of white troops quartered principally on the Senegal and at Goree. In 1866 and 1867 more than two-thirds of their men died from yellow and malarious fevers. At Goree these diseases committed frightful ravages.

In 1831 there was no death among the officers on the coast, and the mortality in the squadron was reduced to 28·0 per 1,000. In 1832 Waterloo was first occupied by a detachment from Freetown. The mortality in the squadron rose to 35·2 per 1,000. There was no death among the officers. The deaths to strength, in the black troops, was 1 to 23·6. An epidemic catarrhal affection appeared at Sierra Leone, attributed to the Harmattans, with a cold easterly wind loaded with watery vapour. In 1833 the ratio amongst the officers was increased, 1 dying and 3 being invalided, while that of the squadron was reduced to 21·4. A case of "lethargus" was admitted into hospital, a private of the Royal African Corps, with the usual symptoms. He was discharged from hospital cured on the 15th of June, after a month's treatment, during the greater part of which period he was either entirely or semi-comatose, and existing almost without nutriment. The millesimal ratio amongst the officers was 87. In 1834 epidemic catarrh again made its appearance, during the same season as that which occurred in 1832. The millesimal ratio of deaths in the squadron was 29·0; that among the officers on the coast had risen to 136. In 1835 the ratio in the squadron was 23·3. Of two cases of remittent fever which proved fatal at Sierra Leone, one occurred in the person of an old man of dissipated habits, who, after two days' exposure to the sun and rain, contracted a fever of the worst type, and died with coffee-ground vomit, after three days' illness, on the 4th of September. In 1836 the millesimal ratio of deaths in the squadron was 16·6, among the officers on the coast 45.

In 1837 the mortality in the squadron was 128·8 per 1,000, in the white troops 290. At Sierra Leone, yellow fever commenced in the colony in February, but the troops were not attacked until the following May. So far back as January several cases of severe country or remittent fever had occurred of a suspicious nature, two of which proved fatal. One of these was from among the crew of a timber ship, the "Mary," which had come from England in December, while loading in the Bunce, a very unhealthy branch of the Sierra Leone River, 6 miles distant from Freetown. She lay there from the 27th of December to the 7th of January (15 days): during this period 15 of her crew were attacked with ordinary remittent fever; 10 recovered, 5 died; none of them had black vomit. After this two of her crew were sent to Freetown with severe remittent fever; one had a relapse, and died on the 13th of February; a few days subsequently the second was attacked with black vomit, the first case with this symptom. This patient had not left the ship while convalescent. The next case occurred in another timber brig, the "Lady Douglass," while lying at the mouth of the Mellicourie, 40 miles north of Sierra Leone: of these cases two died. This vessel arrived at Freetown on the 8th of February; on the 16th, 17th, and 19th, three of her seamen died, having first symptoms of

remittent fever, running into black vomit. A few cases afterwards showed themselves among the merchant seamen until the 31st of March, when it broke out amongst the European residents at Freetown. On this day two cases occurred, and proved fatal five days subsequently. On the 16th, 20th, and 24th of April the next cases were observed, after which the disease became more common. The 9th day was the longest duration of time the fever lasted in an individual case. The fever first showed itself amongst the troops on the 11th of May; in the Navy on the 16th of June, in a prize vessel sent by Her Majesty's ship "Charybdis" to Freetown. The disease commenced in the same season and with the same symptoms as that of 1829, gradually declining with the maturity of the rains, and degenerating into the ordinary remittent or country fever. Of those attacked in July, most recovered.

Her Majesty's ship "Curlew" left the harbour while the fever was at its height; the officers and men had had frequent communications with the shore and the brig "Mary"; during her cruise she lost her Clerk, from fever. She again left the harbour for Gambia; during the voyage malignant fever broke out; on her arrival at the Gambia on the 4th of June, the sick were removed to the ground floor of the Colonial Surgeon's house; 15 men died, including the Surgeon and Master; on the 17th the Colonial Surgeon was attacked, and died on the 20th; the Dispenser died a few days afterwards. The next cases occurred in a house adjoining the Colonial Surgeon's, and another in the house next adjoining the latter. After this it took an eccentric course, but mostly along Water Street. In Sierra Leone, the casualties, one-sixth of the natives, two-sixths of the Europeans attacked.

On the 29th of October malignant fever again broke out in the brig "Huskisson," which had been lying in the harbour, loaded with timber, during the rainy season. She had lost all her crew from fever in the early part of the year. At the termination of the rains, when vessels began to arrive from England, some of their crews, tempted by very high wages, were induced to enter her. On the 1st of November two men entered from the "Martha"; both died. On the 3rd another, a deserter from the "Curlew"; he also died. She was now ordered to leave the harbour. On the same day (the 14th) the fever broke out in the "Martha," recently arrived from England, which had been lying alongside the "Huskisson." From her it spread to the rest of the vessels, and raged with great violence. On the 25th it recommenced in Freetown, in the residents, not attacking the troops. It was not more fatal in the residents than the ordinary fever, most of the cases recovering, while in the shipping it had been most malignant. This re-break out of fever was remarkable, as differing from all which had preceded it by having, in the early part of second stage, a sanguineous exudation from tongue, gums, nose, and anus. When leeches were applied to the abdomen it was impossible to arrest the flow of blood. This difficulty was also experienced, on some occasions, when the bleeding took place from the nose.

In this epidemic, premonitory symptoms were not always present. When occurring, did so as a mere languor of short duration. On the second day, headache, pains in the back, loins, thighs, knees, and legs, were felt; alternate flushings of heat and cold; sometimes rigors, suffused eyes: pulse, 96 to 100 or 120; hot skin; nausea,—sometimes copious vomiting of ingesta; thirst; tongue furred. All these symptoms were aggravated towards evening. The headache increased on getting into the erect posture. During the first night, intense suffering was complained of,—there was no sleep. When present, much disturbed by dreams,—occasionally extraordinary in their nature; awaking was comparative relief. Towards morning there was sometimes sleep, with slight alleviation of the symptoms, the skin becoming moist. The dejections were at first dark, afterwards watery, fœtid, and interspersed with white flocculi. The countenance had a dark hue, and the conjunctivæ was slightly yellow. The patient felt slightly better. Two or three of these febrile paroxysms may have taken place. In the second stage, the pulse was from 68 to 76 (delusive state); skin moist; tongue not so much furred, slightly red at the edges; tremulous; the dejections continued the same. The countenance now became gradually more dark, eyes more suffused, nights again most distressing. On second or third day irritability of stomach set in. The ingesta were first vomited with green or yellow bile, followed by black vomit. Sometimes

petichese were observed, as also subsultus tendinum, singultus, although either frequently absent. The tongue had become dry, hard, and horny, or dry, black, and raw; countenance, while healthy-looking, appeared most anxious; breathing laborious; cold, clammy perspiration; pulse scarcely felt at wrist; coma, ending with death. In 29 of the cases, pain in the back, &c., was most complained of; in 37, cramps. In these latter, typhoid exudation of blood from mouth, nose, anus, petichæ, with suppression of urine, occurred early. The nervous system was also much affected, as evidenced by staggers, tremulous tongue, hands, arms. In two cases, lumbrici were found in the stomach. Some of the patients were deeply jaundiced.

The pathognomic symptoms of this fever were :—1st. A slow languid pulse, which followed cessation of first or second pyrexial paroxysm. 2nd. Delusive absence of obvious pyrexial symptoms which accompanied this stage. 3rd. Concomitant with these the suffusion of the eyes. 4th. The black vomit. The pathological appearances were few but constant. In the cranium, there was nothing abnormal. In the stomach and intestines marks of inflammation, from slight arborescence to appearances bordering on sphucelus; this last was never seen in the stomach, but generally in ilium, omentum vascular. In stomach, contents were similar to black vomit ejected. When washed, a glairy adherent mucus remained, with red vascular patches; intestines the same. The liver was black and mottled. Gall-bladder not so frequently distended with bile as in ordinary remittents; contents dark, viscid, tarry. Spleen not much altered. In one case, ulceration and thickening of large intestine, and great enlargement of mesenteric glands. In one, a large clot was found under the dura mater, and in the rectus addominis.

In the first quarter of 1838, another severe eruption of fever took place amongst the prize crews of the hulk "Conflict." Febrile symptoms ceased on the 13th, but recommenced on the 15th of February, when they were removed to Wilberforce, 500 feet above the level of the sea. This had the effect of arresting the fever, but it again broke out in an aggravated type on the 4th of March, and was not again stayed until the end of this month, after ten of the sufferers had died. The mortality in the squadron was 129·9 per 1,000; white troops, Sierra Leone, 35. In 1839, the millesimal ratio of deaths in the squadron had fallen to 69·6; the white troops, Sierra Leone, 102. In 1840, in the squadron, 37·4; while the white troops at Sierra Leone had risen to 127. In 1841, the ratio of mortality had again increased to 63·6; in the troops, Sierra Leone, had fallen to 69,—half the rate of the previous year. During 1842, the millesimal ratio of deaths in the squadron was 32·8; white troops, Sierra Leone, 75. In 1843, that of the squadron was very low,—18·1. In 1844 it had increased to 25·1; while that of the white troops at Sierra Leone was 74. In 1845, the mortality in the squadron on the coast was 47·6. During this year, three fatal cases of yellow fever occurred at Sierra Leone,—one on the 8th, another on the 15th, and the last on the 16th of August. On the 23rd of July previously, the "Eclair" left Sierra Leone. This vessel, while at anchor at the Shebar, near the Sherbo River, south of Sierra Leone, lost two of her crew on the 23rd of May and 4th of June, from fever,—which could not be distinguished from the disease which subsequently showed itself, and was undoubtedly yellow fever. The "Eclair" afterwards touched at Bona Vista, leaving this island on the 13th of September. On the 12th of October, yellow fever broke out amongst the inhabitants with great violence, causing a large mortality. In 1846, the mortality among the white troops at Sierra Leone was in the ratio of 34 per 1,000; in 1847 it had risen to 102. In this year, remittent fever was present to a great extent, and an epidemic of yellow fever prevailed,—the first case occurring on the 29th of June. Up to this date very little rain had fallen,—between the 25th of June and the 4th of August only 9·58 inches; whereas, in a similar period next year, 31·33 inches fell. The rainy season of 1847 was very irregular. During its continuance, isolated cases presented themselves; and after its cessation, the disease again broke out. When the rains fell in their usual volume, remittents were the prevailing fevers; when irregular, and at its termination, yellow fever. In 1848, the ratio of mortality among the white troops, although still high, had fallen to 94, and in the following year to 63 per 1,000 of mean strength. In the year ending the 31st March, 1848, only 88·46 inches of rain had fallen; to

the 31st March, 1849, 141·15 ; 31st March, 1850, 140·63. The average rainfall for 13 years ending 1859, annually, was 124·038 cubic inches. The quarter ending 30th September, 1852, was remarkable for the large amount of rain which fell,—100·72 c. inches,—and the small amount of sickness which was present. As a general rule, in Sierra Leone the sickness and mortality is in an inverse ratio with the rainfall. In 1850, the mean average strength was 285·7. From this year until 1863, it rarely exceeded this,—the garrison of Freetown consisting of a wing of one of the West India Regiments,—the average European force not exceeding 20 officers and men. In 1851, a good deal of painless diarrhœa was observed at Sierra Leone, particularly in April and May. The evacuations were fatty and light-coloured. Two cases of cholera occurred among the Europeans. The principal symptoms observed were copious watery evacuations, alteration of voice, complete collapse, and suppression of urine. Both of these cases recovered. During the interval between this and 1859, the usual malarial fevers prevailed more or less extensively. As a general rule, the admissions for intermittents and remittents among the white officers and non-commissioned officers were equal to the average strength, plus one-half as much again. In 1857 and 1858, the strength of black troops had risen to 329·8 ; the rainfall, 132·640 cubic inches. During 1858 and 1859, when epidemic fever again presented itself, the rainfall had decreased to 97·067 inches. In 1859, the season had been very irregular, the Harmattans blowing much longer than usual. Very dry and parching winds followed. The rains were unusually late and scanty. Yellow fever made its appearance in April, and during the three months ending the 30th of June carried off 35 Europeans, or nearly one-half the white population. The garrison was comparatively healthy. The average strength of black troops was 356. From among them there were 193 admissions into hospital and 5 deaths,—being in the ratio of 542 and 14·02 per 1,000 ; while in the 18 years ending 1836, the millesimal ratio of admissions averaged 812, the deaths 30·1. Towards the close of this year variola became epidemic. The disease broke out among a batch of recruits taken from a slaver. It had ceased in January of the succeeding year. In 1860, the ratio of admissions into hospital was 615 ; the deaths 34·30 per 1,000. The former chiefly from miasmatic and enthetic diseases. In this year the rainfall amounted to 131·73 cubic inches. In 1861, the millesimal ratio of admissions among the black troops had risen to 1013·6 ; the deaths, 40·53. This was principally the result of paroxysmal fevers induced by exposure in the field during the war in Quiah, which commenced in November previously. The officers encamped at the Rifle Range suffered severely from remittent fever ; one, ultimately invalided, had had paralytic symptoms, coexisting with febrile disease. With the exception of two cases of insolatio, the officers suffered little while in the field, although subject to much exposure in the sun and rivers. The excitement and activity natural to such events,—the columns being rarely more than one or two days away at a time from their base of operations, which was well selected ; provisions, such as they were, not being deficient ; and officers and men being fairly housed, —were the chief causes which conduced to this favourable result.

The admissions from accidents and violence amounted to 64, including 2 killed and 14 wounded. Two officers were wounded ; one,—the Lieutenant-Colonel Commanding,—so severely, as to incapacitate him, at the time, from further duty. From among the Militia and native allies there was a considerable number admitted. The wounds of the latter healed much sooner than either of the two former,—probably from their simpler mode of life. After the cessation of hostilities in February, when the excitement had passed away, remittents and intermittents prevailed extensively among the officers who had been engaged in this bush warfare, the malarial poison hitherto in abeyance now giving external manifestation of its presence in the system.

Prince Alfred's, or Songo Town, 10 miles distant from Waterloo, was first occupied in 1862. The Sherbo, a river some 60 miles to the south of Freetown, was also taken possession of in October. A short time after the arrival of the detachment, both officers belonging to it were attacked with a bad and low form of remittent,—one, in addition, with dysenteric diarrhœa. This resulted from subsisting almost entirely on salt provisions, flour cakes ; being obliged to drink highly-malarious surface-water, and living at a station abounding with mosquitos, and essentially a tidal mangrove swamp. In 1862, the millesimal

ratio of admissions among the black troops at Sierra Leone was 794·9, the deaths 28·36; in the four years ending 1862, the deaths from consumption and diseases of the lungs averaged, at Sierra Leone, the very high rate of 17·64 per 1,000,—probably from occasional overcrowding (the nature of their food consisting almost entirely of rice) and defects in the clothing arrangements. The men composing West India Regiments are exceedingly prone to affections of this nature, diseases of the lungs, whether acute or chronic, running in them a very short course; acute inflammations, seldom terminating in resolution; while the aborigines seem to be singularly exempt from chest affections, although much more exposed to the vicissitudes of the weather. But the native, when "Europeanised," is more liable to disease than while remaining in his original state of semi-nudity and freedom. In 1863, the admissions had risen to the ratio of 1125·6 per 1,000, the deaths 25·59. The Island of Bulama, 300 miles to the north of Sierra Leone, one of the Bijouga group, at the entrance of the Jeba and Rio Grande, was now occupied by a detachment from this station. In this year, the head-quarters of the 3rd West India Regiment replaced the demi-wing of the 2nd West, which had garrisoned Freetown. In this way the mean average effective of black troops was raised to 444. Out of this number, in 1864, the millesimal ratio of admissions was 1,065, of deaths 27·01. Towards the close of this year, remittent fever prevailed extensively among the residents of Freetown. In 1865, the average effective at Sierra Leone had reached 540, while the ratio per 1,000 of admissions had fallen to 878, the deaths to 22·21. Of three non-commissioned officers of the Royal Engineers, sent to this station for the purpose of superintending some works in progress, two died of remittent fever, the other was invalided to England. The remittent fever which had prevailed in the colony at the close of 1864 continued its usual course in 1865. During July and August, three deaths occurred among the officers of the garrison. The deaths among the European residents for the previous twelve months, ending 31st July, numbered 29,—a large mortality from among a white population which in Freetown amounted to not more than 100. The census for 1861 gave 130 as the number of Europeans residing in this colony. In one of the officers who died, just before death a darkish fluid was ejected from the stomach; there was also slight jaundice.

The fever which at this time prevailed at Sierra Leone was a remittent, not of an ardent form, and characterized chiefly by terminating with symptoms of cerebral congestion, which almost invariably ended fatally. The patient, while feeling slightly relieved from the febrile symptoms, would be suddenly attacked with coma; suppression of urine, in some cases. Towards the end there was difficulty of breathing, congestion of conjunctivæ, unequal contraction of pupils, ptosis, difficulty of swallowing, and conveying sensory impressions, singultus, subsultus tendinum, complete insensibility, two or three convulsive motions of the chest, ending with death, just before which the contents of the stomach were ejected. Should the patient have recovered from the primary febrile disease, the convalescence was very precarious, and a relapse invariably fatal, and ending with symptoms similar to those described. At the close of 1865, yellow fever appeared among the sailors and European residents at Sierra Leone, proving extremely fatal. The disease prevailed principally in Her Majesty's receiving and coal hulk "Isis," and seemed to be perpetuated from one newcomer to another, nearly every European who took up his residence in her becoming a speedy victim to yellow fever. Her Majesty's ship "Rattlesnake," after communicating with the "Isis," was visited with a severe epidemic of this disease, as was also the celebrated "Kersage," of the American navy.

On the 28th of December, 1865, a party consisting of 112 men and four officers went on board the "Isis" from the "Bristol," which had just arrived from England, and remained at anchor off Cape Sierra Leone. The Harmattans were in full force at Freetown; this party worked on board the "Isis" for two days, returning each evening to the "Bristol"; were not exposed to the sun, and each individual had served out to him four grains of quinine before leaving in the morning. On the 31st a seaman belonging to this party was attacked, and died on the 3rd of January with symptoms of yellow fever. An Engineer officer who had remained only four hours on board the "Isis" on the 29th was attacked on the 31st, and on the 1st of January 20 cases of yellow fever also occurred; on the 2nd, six cases; on the 4th, three; on the

5th, two; on the 6th, one; and on the 12th, one; a total of 38, 29 of which presented symptoms of yellow fever; among these 21 deaths occurred. No one was attacked in this epidemic except those who had been on board the "Isis." One of the sufferers had been on board for only a quarter of an hour; in no instance did the disease spread to the attendants or Medical Officers. The average duration of the fatal cases was 4·3 days; two died on the second, and two on the eighth day. On the subsequent removal of the sick to the hospital at Ascension, no case occurred in the nurses or Medical Officers of that establishment, although two men subsequently died there.

The chief symptoms observed in this epidemic were lassitude, giddiness, dull headache, aching of bones, sometimes a severe rigor; alternate flushings of heat with chills, flushed face, injected eye, dull, heavy, anxious countenance; unwillingness to speak, answering vaguely when questioned; impaired sensation and use of limbs, especially of legs; impairment and loss of sight, optical delusions; loathing of food; intense thirst; large, pale, flabby tongue; pulse, 120 and upwards; excited and forcible action of heart; sighing respiration; pain, and tenderness of abdomen; confined bowels; scanty, bilious, albuminous, bloody urine, offensive, oniony smell, sometimes containing hoppuric acid in large quantities; sugar and tube casts; skin burning, harsh and dry, or with local perspiration; cold feet; dusky yellow tinge of cuticle; papular rose rash, or sudamina; body-temperature raised six or seven degrees; voice husky and low; intollerance of light and sound; restlessness and delirium; sponginess and hæmorrhage from the gums or nasal mucous membrane; vomiting at first of ingesta, then thin and watery, bilious, gradually darkening and becoming thicker, streaked with dark flocculi, terminating in profuse black vomit, the stools being of a similar colour; the body emitted a strong ammoniacal odour. On the third or fourth day the symptoms remitted, pains in head, eyeballs, and back decreasing, as also the pulse; perspiration occurring in the skin, bowels acting, urine passing more freely. Convalescence either dated from this, or in the evening the former symptoms recurred with increasing violence; urine became suppressed; attempt at swallowing causing intense agony, as if a flame of fire was darting down the throat; increased yellowness; black vomit, ending with coma, delirium, and death. The special symptoms were marked spinal irritation about 11th and 12th dorsal vertebræ; intense muscular irritability, in some dull mottling of abdomen; local dropsy; swelling of lymphatic glands; sloughing of the skin of scrotum and penis (a severe epidemic chiefly characterized by this symptom occurred at a later period of this year, 1866, on the Gold Coast, the scrotum and penis sloughing away entirely before death) priapism and spermatorrhœa.

The treatment, which had little effect on the disease, consisted at first in administering a purgative (sulphate of magnesia); when the bowels had acted, a mixture of nitrate of potash and tartar emetic in camphor water every five hours. Supply of barley water, lemonade, thin arrowroot, *ad libitum*. On the remission taking place a scruple dose of quinine; three of these followed by 10-grain doses every four hours afterwards. On failure of vital powers, stimulants constantly administered, brandy and water, beef tea, &c.; head shaved, and cold evaporating lotions applied to scalp. When the patient became comatose, cold effusion and blisters to the nape of the neck; for irritability of the stomach, sinapism to epigastrium, chloroform, hydrocyanic acid, dil: chlorodyne, bismuth: enemata of quinine, beef tea, and port wine. When the quinine was rejected from the stomach a solution of alum applied to bleeding surfaces. Catheter introduced to ascertain condition of bladder; turpentine stupes and fomentations to loins to relieve the intense lumbar pains.

In 1866 the average strength of the black troops at Sierra Leone was 498, the ratio per 1,000 of admissions, 1383·5; of deaths, 28·12; the millesimal ratio of admissions from enthetic disease alone was 536·2, double the average of the former year. The "Isis," which had caused so much mortality, was condemned as a receiving ship, and removed from opposite Freetown to an anchorage in the Sierra Leone River. The febrile disease which had committed such ravages during the early part of this and the whole of the year 1865 had assumed a much milder form, yellow fever having altogether disappeared. The next year (1867) was a very unhealthy one, a great deal of remittent and other fevers prevailed among the officers of the garrison; there was one death from malig-

nant remittent at the Sherbo, ending with bleeding from the mucus membrane of the nose and mouth, cerebral congestion, coma, and slight discolouration of the skin after death; out of 10 white non-commissioned officers one died, and one was invalided; the officers numbered a mean annual effective of 30, from which were 51 admissions on the sick list. The mean average effective in the squadron on the Coast was 1,680; the number of cases entered on the sick list 3,744, a ratio of 2067·8 per 1,000, a decrease of 121· per 1,000 on the former year. The daily loss of service from fever was 14·8 per 1,000, 519 cases of remittent or continued fever were admitted on the sick list, 40 of which terminated fatally. The average duration of each case of primary fever was 13 days, of yellow fever 17 days, and of ague 20 days.

Having now reviewed the principal events in the Medical History of Sierra Leone from 1816 to 1866, an interval embracing half a century, it only remains in conclusion to make a few remarks on those conditions, which together have made this colony so unhealthy. In the earlier years of its existence the colonists underwent great privations, which in themselves would be sufficient to cause disease in Western Africa even in the present day, as evidenced by the last Ashantee war, similar conditions causing a large mortality even among native troops. The earlier European settlers were also very dissipated; until 1828 the white troops were quartered in situations and buildings totally unsuited for the tropics; their rations, from their composition, tended to render scorbutic a circulatory fluid, already spanæmic from the debilitating influence of malaria, and when the Royal African Corps was formed, it was recruited from men notoriously careless of life, it could hardly be wondered that disease under such circumstances committed frightful ravages. Freetown at that time was surrounded by dense forests and underwood, the annual decay of whose *débris* added considerably to the already existing paludal poison. Since 1830 the European force at Sierra Leone has been so small, and the facility of invaliding has become so much easier, from the more frequent communication between the colony and Europe, in addition to the short period of service officers and men are now required to put in on the coast, that it is really difficult to say how far climatic influences act *per se* on the European constitution. If we take the returns of the Royal Navy we find the ratio of admissions 2067·8 per 1,000 for 1866; while in China the ratio of admissions was 1470·7 per 1,000; and in the North American and West Indian, 1432·4 for the same force; and in Bengal the ratio of admissions among the white troops was 1,443. Curiously enough, the admissions from the squadron on the coast during 1866 approximate very closely to the average yearly admissions among the white troops on the coast of Africa from 1817 to 1837, viz., 2,978 per 1,000; considering that the latter were of a different class, and enjoyed none of the sanitary advantages now so freely bestowed on either of the former.

In addition to the ordinary climatic influences which, from the situation and natural configuration of this colony, will ever render Sierra Leone hostile to the Europeans, there are many entirely adventitious, viz., intemperance, want of personal cleanliness, exposure to the sun or rain, excessive sexual indulgence, deficient exercise, late hours, ennui, sleeping during the hottest hours, all of which being debilitating causes, add to the anæmia resulting from malaria alone. While some are imprudent enough to commit some, if not all, of these excesses, it is equally certain that those who lead a regular life do not escape; but still they are certainly the most healthy. With the exception of cases occurring during epidemics, most of the worst forms of remittent fever at Sierra Leone are due to exposure, or any cause which suddenly disarranges the usual combining together of the vital processes, such as a wetting, bathing in the sun, or a debauch, with subsequent exposure to the dew and night air, which quickly checks probably a profuse perspiration, and suddenly increases the effete matter of the blood, already loaded with the impurities and germs of disease. The blood naturally becomes spanæmic in a malarious country, as evidenced by the great pallor, loss of flesh, and profuse bleedings, which arise from very slight injuries. It is this condition of the blood which renders child-birth in the white female so fatal from *post partum* hæmorrhage in this and the other African colonies.

In former years the mortality was no doubt increased by imperfect and injudicious modes of treatment; the extent to which mercury was used was

really astounding; except as a mercurial purge, it is now rarely administered. A great number of deaths took place in the timber vessels which years since frequented the coast of Africa. This trade is now almost extinct, but even at present the mortality among English merchant seamen is very large, ships frequently arriving at Freetown after having lost one-half or two-thirds of their crews from remittent fever, contracted in the neighbouring rivers, the exhalation from whose mud tanks are highly malarious; in addition, the uncleanly habits of the men themselves, their living huddled together in the forecastle, devoured by the mosquito at night, or being exposed to the sun during the day time, and the defective dietetic arrangements, allow the poison to act much quicker and sooner than it otherwise would. Although intemperance frequently leads to the worst forms of fevers, particularly when associated with exposure to the sun or night air, it is equally certain, in such a debilitating climate as that of Western Africa, a course of life based upon the opposite extreme would be equally injudicious. You require stimulants and good food in this colony, but you should use the former in moderation. Many a life has been saved by the judicious use of a stimulant, even when the individual has appeared in *articula mortis*. The food obtainable at Sierra Leone is poor in quality, and especially deficient in fat; the diet is varied with difficulty, than which nothing can be more unhealthy, for it becomes monotonous, and engenders an impaired appetite. Exercise becomes difficult at Freetown, from the difficulty of procuring horses, and the short time they live when obtained. This is a great drawback to a residence in this colony.

In Sierra Leone affections of the spleen are not so common among the white residents as in other parts of Africa; this is probably owing to the large percentage of iron contained in the soil, 30·187 in 100 parts; but enlargements of this organ are very common among the native and Creole children residing in the swampy districts bordering upon the rivers. As a preventive of fever, quinine, when taken in small doses, does not seem to be of any use; if given so as to cause slight cinchonism during the premonitory feeling of malaise, which generally precludes a malarial paroxysm, it may cut short or modify its course, provided means are at the same time at once adopted to ensure rest and an increased action of the skin and bowels.

If the preceding remarks indicate those causes which predispose to fever in Africa, their avoidance indicate those hygienic measures which are useful for its prevention. If we cannot banish malaria, we can at least refrain from increasing its noxious effects by our own imprudence. An efficient system of quarantine undoubtedly will locate and prevent the spread of yellow fever, but the laws relating to this subject are so vague and so loosely carried out, that they are practically useless; and now, when cholera threatens for the first time in the epidemic form to spread along these settlements, it is absolutely essential that they should be carried out in their entirety, in order at least to test their efficiency. Western Africa will become truly unfortunate, if to the numerous forms of disease which already exist is added that of a malady which is as hostile to the native as malaria is to the European. That these causes act in their entirety in producing disease must be acknowledged; the great difficulty is to isolate them; for as Liebig says, "Far more difficult is it "even for the attentive observer to perceive the injurious influence which bad "air or impure water, or an insufficiency of food, exercises on the health of "the population, as here the injurious influence is made up of a number of "scarcely perceptible causes. If the air and water teem with pernicious in- "fluences,—if the air abounds in damp, carbonic acid, and organic matter in a "state of suspension,—if the water abounds in matters which are in a state of "decomposition,—if the nourishment be wholly unfitted for digestion, and for "the support of the vital process, then the harmful effect is quick, and we are "seldom deceived as to the cause of the disease which has arisen. If, however, "the impurities in the air and water be but trifling, and the nourishment merely "deficient in quality, the injurious influence produced from one day to another "will scarcely be perceived; but the effect is *none the less sure*. A state of sick- "ness comes on sooner or later, which is ascribed to a number of *chance derange- "ments*, but very seldom to the *right cause*."

APPENDIX No. XVII.

THE RUSSIAN CAMP AT KRASNOE SELO, COMPARED WITH THE CAMP AT CHALONS.—By Dr. O. HEYFELDER.

(Translated into English from the German Translation, by THEODOR BORCHERT, Esq., Army Medical School.)

STANDING Camps deserve in every respect a special attention.

They are at first country residences for troops who, having originally sprung from the country, had been compelled to crowd together in the barracks of towns, and are now for a short time brought back to their own element.

Standing Camps serve also eminently the purposes of drill and practice from a military point of view, in hardening the troops, and in preparing them for actual war, by rendering them acquainted with all the features of camp life and warfare. Medical Officers and their assisting subordinates find in camps an opportunity for gaining practical experience.

A standing camp also furnishes a precious opportunity of trying and probing newly-introduced appliances, and of carrying out improvements under the eyes of officers of all ranks.

The experience hitherto made in camps has proved their beneficial influence on the health of the troops, and it has led to numerous important and useful arrangements in the administrative and sanitary arrangements of the Army.

1. *Introduction.*

Standing camps have been found only in this century, viz., in Russia and in France. In France, since 1803; in Krasnoe Selo, since 1823; since which time they have enlarged nearly every year, with few interruptions. Seventy thousand men were gathered in camp in the year 1864; 46,000 in 1865.

2. *Locality.*

Krasnoe Selo lies 25½ verst (17 English miles) from Petersburgh, 20 miles from Oranienbaum, and 12 miles from Zarskoe Selo. There is a flat, oval-shaped valley, enclosed on two sides by a higher plateau, and in the south-east by two wooded hills. In this valley there are three lakes, the level of the uppermost one being 30 feet above the lowest one, and their numerous confluents are springs and rivulets. Their outlet runs in the direction of Petersburgh, and falls into the Gulf of Finland. A good carriage road and a railway run to the village of Krasnoe Selo. The soil belongs to the same siluric formation which characterises the province of Esthland, only it shows very few of the rounded bits of granite.

Under a sward of thick short grass there is a layer of clay and sand, 2 feet thick, overlying a hard fissured limestone, which allows all rain-water to sink away soon, but is at the same time sufficiently retentive of moisture to prevent, even at summer heat, the formation of dust on the roads, and on the large uncultivated high plateau, which is extensively used for marching the troops.

In this respect the soil is much superior to that of Chalons.

The air is pure, and generally milder than that of Petersburgh, which lies lower. The tents are erected on the upper part of the slopes, so as to be protected from the strong land winds; but they are open to the sea wind (west), which is slightly charged with moisture, tempers the summer heat, and agrees generally with men and vegetation. The numerous springs and watercourses

have sufficient fall to prevent the disadvantages of stagnant waters: they give many opportunities for swimming, bathing, and cleanliness in general.

The spurs of the hills are partly wooded, partly cultivated; but the plateau itself, not being of easy access, has been left in the uncultivated state, forming a large, hard, dustless plain of about three English square miles, eminently fitted for tactics, evolutions, and for the construction of camps.

The great camp and the advanced guard occupy the edge of the high horse-shoe-shaped table-land.

In the immediate neighbourhood of the camp is a fine park, with hotels, inns, &c., an imperial theatre, numerous country villas all round, where in summer time the officers' families reside.

The country around, in a circle of one or two English miles, offers several parts suitable for excursions, near the Lakes, or to the Dudenhofer Hill.

In the village of Krasnoe Selo are the residences of the Emperor, his Ministers of State, and several villas for his family and many of the higher Staff Officers; besides, there is a fine church, an hospital, and telegraph station. Krasnoe Seloe has the best prospect of all places near Petersburgh; it gives the finest view towards the north, over all the surrounding country and the Gulf of Finland, enlivened by steamers and sailing vessels; towards the north-west the gilt cupolas of the cathedral of Petersburgh present themselves; in the south-west there are the three lakes, enclosed, as it were, by the light-coloured tents of the camps, and by the hills of Dudenhofer and Kirchdorf.

As far as regards site, condition of soil, water, air, easy access, and fine scenery of the locality of the camp of Krasnoe Selo, nothing more can be desired.

3. *Transport of Troops.*

The troops that form the camp are chiefly the Guards stationed at Petersburgh, Peterhof, Narva, Oranienbaum, Novgorod, and Finland. All march to the camp in short journeys. The northern nights being less dark than in more southern countries, the troops start very early in the morning, so as to arrive at their destination before the day's heat has set in.

Short journeys are chosen on principle, to avoid all overheating of the men, and to prevent stragglers lagging behind. In order not to block up the roads, it is arranged that the Artillery start first; it is followed by Infantry, and then by the Cavalry.

4. *Distribution of the Troops in Camp.*

In 1864, there were 70,000 men in camp, viz.:—Infantry, 57,410, with 1,070 horses; Cavalry, 7,618 men, with 6,239 horses; Artillery, 4,307 men, with 1,960 horses: total, 69,335 men, with 9,269 horses.

The troops occupy a circle of 5¼ English miles radius.

The Infantry and a part of the Artillery are placed in tents and barracks (huts); the Cavalry and Horse Artillery have to be stationed in the neighbouring villages. Two divisions are placed in the tents on one side of the hill, on the opposite side are two more divisions, including the vanguard.

Each company consists of 16 tents; each battalion forms a square of 8 rows of tents, eight tents deep; each regiment of men occupies about three English square miles.

The camp throughout is arranged in three zones of three lines each, the zones being separated from each other by broad main roads, and even gardens.

In the middle of the camp only this regularity is broken by the groups of the Imperial tents and that of the Commander-in-Chief.

The arrangement is as follows:—

CANNON, AND CHURCH.

1st Main Road.

I. Zone..	Tents of the Men	1st Line.
	Tents of the Officers	2nd „
	Gardens, Gymnasia, Musicians' Tents, with Stables for Artillery	3rd „

2nd Main Road.

Principal Road with Telegraph.

Main Sewerage

II. Zone..	Officers' Barracks—	
	Arsenals	1st Line.
	Men's Cook-houses	2nd „
	Men's Dining-rooms	3rd „

3rd Main Road.

III. Zone..	Hospitals, Officers' Mess-house, and Bake-house	1st Line.
	Forge, Stables, and Vapour Baths	2nd „
	Horse Pond.	
	Latrines	3rd „

4th Main Road.

Shooting Ground for Rifle Practice.

5. *The Encampment of Cavalry and the Placing of Horses.*

Formerly, on the right flank of the camp at Krasnoe Selo, provision was made in tents for men and horses. To obviate many inconveniences, this arrangement was altered in 1852, and at present the Cavalry and Horse Artillery are housed in the villages around; the horses in the stables or premises of the countrymen (farmers); the men and officers are lodged in the villages, with the view of preventing the men from living in the same rooms with the horses, or from bringing the harness into their quarters.

These improved arrangements excel by far those in use at the camp at Chalons.

The leading principles involved are the following:—

1. Cavalry and Horse Artillery to be encamped separately from Infantry.
2. Cavalry do not camp in tents, but in villages.
3. The horses are no more left in the outer air, simply coupled together, but are kept in wooden sheds.
4. Even the horses of the Train and Artillery are not, if possible, kept between the tents of the Infantry.
5. Harness and pack saddles are not to be kept overnight in the quarters, but in the stables.

6. *Tents.*

The Russian tents for Infantry are quadrangular, 14 feet square, and 7 feet high, intended to give accommodation to 15 men, although 12 generally are only placed in them. The canvas is borne by a centre pillar, and four corner poles, being kept in tension by ropes fixed to pegs in the ground. The soi inside is well smoothed and beaten, sometimes covered with boards.

Round the tent inside there is a bench (1½ feet broad), covered with straw mattresses, and sheets and small pillows (or the pack instead) for sleeping. A wooden rack round the centre pillar receives the arms of the men, forming a sort of pyramid, and leaving a clear walking space of 2 feet broad all around. Round the tent outside a circular turf mound, 1 foot high, forms the understructure of the tent. The circumvallation renders it unnecessary to dig out the soil inside the tent, as it is done at Chalons. Drs. Perier and Roth consider this deepening of the floor of the tent quite objectionable.

The canvas may be entirely or partly lifted up for better ventilation. Officers' tents are provided with double canvas, to keep out better the wind and rain, although ventilation in them is more precluded. Dr. Colmant has proposed to sew the two canvas layers close together, and thus to obtain improved ventilation by better protection from wind and rain.

A tent serves either for one Staff Officer or for two higher officers, or 15 men, or from two to six officers' servants.

Between the tents there are reserved grass plots, and small channels to carry off rain water to a larger ditch by the side of the main road through the camp.

7. *Barracks or Huts (Baracken).*

At Chalons an entire division is lodged in barracks; but at Krasnoe Selo they are especially made use of by the more stationary establishments, as the administrative and sanitary departments, chiefly for offices, bakehouses, vapour baths, hospitals, &c.

An officer's barrack is 18 feet square, 14 feet high, constructed of boards, roofed in with boards or slates, which project considerably outside to keep off the rain.

It is enclosed at its lower end to one foot high, by a grass mound, and contains one larger, one smaller room, and an anteroom, for the accommodation of two officers.

Each battalion has five officers' barracks and three arsenal barracks. The Commander of a regiment has a much larger barrack for his sole use.

8. *Vapour Baths.*

The custom of using vapour baths frequently is an essential part of Russian life, and consonant to the feelings of the people generally, therefore a building for this purpose has been provided, and the troops are marched to it once a week, as a matter of course. The activity of the skin, generally depressed in northern climates, is hereby stimulated and regulated. During 15 or 20 minutes the body is exposed to hot steam, then rubbed with a bunch of coarse bass, beaten with birch rods, smeared with soap-lather, at last washed off under a cold douche.

The functions of the skin are by those baths so well kept up, that skin diseases are comparatively rare, or are soon cured, and in no country there are so few cases of itch as in Russia.

The men by companies depose their clothes in one room, enter then the steam compartment arranged in stages of different height; they enter at the lowest stage, and gradually get higher into a higher temperature. The floors of the stages are covered with boards, which allow the superfluity of moisture to run off.

The steam is generated by pouring water now and then on a few large felstones kept red hot in a wide tube heated by the furnace.

Besides the vapour baths there are numerous establishments for cold bathing and swimming on the border of the three lakes mentioned before.

Courses of instruction are here given to the men in swimming in bodies, with full clothes, arms, and knapsacks on.

9. *Latrines.*

The latrines, although placed at some distance from the inhabited places, and in the direction of the reigning sea winds away from the camp, leave much to be desired, and their proper working is far behind the experience which the French (at Chalons), and the English in India have made, and introduced in practice.

On the banks of a tolerably deep cutting in the ground there are two series of screened partitions boarded off, the one for officers, the other for men. The ordinary cut-out sitting boards are fixed on wooden props in free air. The urinals are represented by a long wooden trough, which leads the urine to the same uncovered ditch where the excreta accumulate. No sort of irrigation, or flushing, or any disinfection by chemical means is thought of. Once or twice a week neighbouring agriculturists remove the contents by carts, leaving always a certain amount for fermentation.

The officers' messes and the hospitals have their own latrines in small huts, similar to those used in villages. Now if we take into consideration the amount of excreta from 70,000 men daily, and the influence which they must exert on the purity of the atmosphere and the health of the men, and that in certain epidemics, as cholera, dysentery, &c., the fæces are the bearers of infection, it certainly must appear necessary that the latrines should undergo a

complete reformation. It may be said that from those closets, however primitive, and however imperfectly they are cleaned, no bad effect has hitherto been experienced; but the S.E. wind brings, as a rule, I am told, an unpleasent smell all over the camp, and in the case of an epidemic, would surely assist its spreading. This evil ought to be remedied, and an establishment so excellent and well maintained in the rest, as Krasnoe Selo undoubtedly is, ought to utilise the later experiences and newer discoveries in this respect.

We shall just briefly mention what the French at Chalons and the English in India have established in this respect.

Roth describes the French camp as follows:—

The system of moveable latrines (Fosses Mobiles) has been adopted. The essential point in them is that they must be established in a somewhat raised position; in fact, they are got at by three steps.

In the floor covered with a layer of asphalte there are holes underneath in which tubs are placed.

The back of the latrine is furnished with well fitting doors, through which the cask may be removed (by contract), and replaced by empty ones.

Thus the presence of putrefying matter is rendered impossible; moreover the cask undergoes every time a disinfecting process (not well known because patented in France) by sulphate of iron, apparently by mere external powdering over with it. The officers' latrines are single closets with lock and key. For the men there are several sitting boards in the same room. As the latrines are placed towards the north opposite to the reigning southern winds, there is no chance for bad smells to reach the camp. The asphalte floors are flushed with water once a day. In the hospital a similar arrangement is made use of. Each large ward, which is a building by itself, has at its northern end an additional wooden shed separated by two doors, and containing two seats; the shed may be entered by a door from outside, the tubs exchanged, and the iron solution poured in.

(A description is here given of the labours of Stewart Clark in India in 1864, of the use of antiseptics, including that of carbolic acid, and of Macfarlane's latrines, &c.)

The cheapest and simplest arrangement which has come to Roth's notice is the system of Müller-Schür (invented by Professor Müller, of Stockholm, improved by Dr. O. Schür, of Stettin), which is practically worked in Stettin in a military hospital, and at the hospital tents in the same town. The system consists in separating the liquid and solid excreta, in mixing the latter by mechanical means with powdered charcoal and lime, and in absorbing the urine by coarsely broken peat. The result of both proceedings is to obtain an inodorous, easily transportable, and efficient manure, which agriculturists may find valuable, worth paying for. Such manure when given in contract will be removed at stated times, and defray greatly the working expenses for the disinfecting and absorbing powder (one pennyworth, or half an ounce, being required per man daily). 100 men per year will require 1,000 or 1,200 lbs. (cost 25*s.* or 30*s.*) of this disinfecting powder; but the latrines in the Stettin Hospital are the only ones which are entirely inodorous.

Besides this, another want is felt at Krasnoe Selo. There ought to be during the night a series of smaller urinals, or night tubs in the camp (the latrines being some distance away), else the men will make their water on the soil between the tents, and cause stenches very soon.

10. *Prisons.*

Since the abolition of corporal punishment prisons in the camp have become a necessity, there being only two kinds of punishment left, viz., increase of service, and deprivation of personal liberty; the latter has three grades: 1. Common arrest (lock up); 2. Arrest with isolation; and 3. Solitary confinement. But this subject is insufficiently developed yet, and better deferred at present.

11. *Officers' Messes.*

The officers' messes are situated in the third zone behind the hospital road and are surrounded by a space of land which is converted either into an orchard

or a flower and kitchen garden. Those messes are kept and maintained at the expense of the regiment. Therefore, they are not all of the same type, shape, size, or architecture.

(A description follows of these mess establishments, the dietary and mode of life of the officers, &c.)

12. *Soldiers' Kitchens and Dining Rooms.*

The soldiers' kitchens, one for every company of 150 men, are placed in the second zone behind the officers' barracks, and the arsenals. They are wooden barracks closed on three sides, open on the fourth towards the dining-tables. They are provided at the longest closed side with a large furnace, several boilers, roasting oven, &c. As they are close to the dining places the meals are easily and rapidly served. There are four kinds of dining places, the last kind is that introduced in Semenof's and a few other regiments. A long rectangular space is entirely roofed in, at both the smaller ends is a kitchen, and in the middle space the dining hall, with three or four long rows of tables and benches. In other instances the kitchens are separate from the dining-rooms, and either connected with a bakery, or a washhouse, to economise fuel. In those cases the dining-rooms are either covered from above only but open on all four sides, and sometimes draughty; or they are uncovered from above, on a boarded floor, with propped up tables and benches; or dining is done under birch trees at best (or even in the free open air) on raised grass mounds with elevated grass seats, exposing the men to rain, wind, and sun. The latter way is supposed to teach the men how best to manage dining in times of war. But the Government is already contemplating to introduce the first kind throughout the camp, as it is thought unnecessary to expose the men during the dining hours to rain or draught, considering that a soldier has no other place to dry himself in but his tent, whereas during marches or daily practice no notice can be taken of rain.

13. *The Bakery.*

In the Russian camp bread is baked every day in the regimental oven, only the 2nd Division have agreed amongst themselves to have their bread baked in a larger establishment, arranged to the system of Espinasse, the same as employed in the French camp at Chalons for all the troops. The French bake only every other day.

14. *Food.*

Grain for making bread is supplied by the military stores, $2\frac{1}{4}$ garnets = 1·84 cubic foot = 10 litres for every man per month, the remaining articles are supplied by contractors, who have to undergo a very close control.

Meat is supplied every day fresh, either by a butcher or from an own slaughter-house which is situated to the north of the camp, and so far off that affluvia from it cannot reach the camp. Every day one of the veterinary surgeons is told off to examine the animals to be slaughtered.

Each company chooses a representative from the economy department to receive the supplies from the contractor, to purchase other necessaries, and to hand all over to the cook. The meat is to be supplied the evening before, and examined by the captain, the orderly officer, and the surgeon, each of whom has full power to reject it and have it exchanged till considered of good quality.

The bread baked fresh daily is dark brown, nourishing, and superior to the Prussian "Commisbrod" (soldiers' bread). Wheat bread is supplied to patients and officers only, although the latter mostly prefer brown bread, it being nothing else than the national bread, which is never found wanting even on the table of the wealthy.

This brown bread has, besides, a good property, it cleanses the teeth and supersedes the obligatory tooth brush of the French soldier. All Russian soldiers and peasants have very clean white teeth. The ration of bread is three Russian pounds, or one and one-sixth kilo. daily.

Dinner is served at 2 o'clock, consisting of half a pound of meat (7 oz. Prussian), mostly beef, seldom pork; "Gruetze" (gruel), chiefly of boiled

buckwheat, rarely of barley; and the national soup called "schtschi," composed of bouillon and "saurkraut" (sour cabbage), well boiled together, which by its consistency and taste represents both bouillon and vegetables; on fast days potato soup, or pea soup, or "schtschi" is eaten in rotation; at supper time, 7 o'clock, the men get soup and gruel; two meals form the ordinary fare, but whenever manœuvring or drill, &c., is likely to retard the dinner a warm lunch is served consisting of soup, of gruel boiled with small slices of beef. Those meals are in harmony with the ordinary meals taken usually by artisans, and answer all purposes of nourishment. Bread and gruel represent the cereals, meat and bouillon the nitrogenous protein compounds, and potatoes and "schtschi" the vegetables.

TABLE showing the Daily amount of Provisions for each Man.
(There are 196 Meat Days, and 169 Fast Days in the Year.)

	Meat Days.	Fast Days.	
	Meat with Schtschi and Gruel, 196 Days	Schtschi and Gruel, 117 Days.	Peas and Gruel, 52 Days.
Bread (rye)	42 oz. Eng.	42 oz.	42 oz.
Meat	7 oz Eng.	..	..
Saurkraut (sour cabbage) ..	14·5 fl. oz*	14·5 fl. oz.	..
Chervil (an aromatic herb, fresh)	..	1·1 oz.	..
Peas	..	..	2·33 fl. oz.
Oats (unhusked)..	0·5 fl. oz.*	0·7 fl. oz.	0·28 fl. oz.
Flour	0·7 fl. oz.*	0·7 fl. oz.	..
Onions	0·2 fl. oz.*	0·3 fl. oz.	0·5 fl. oz.
Pepper	3 grs.	3 grs.	3 grs.
Bay leaves	3 grs.	3 grs.	3 grs.
Vegetable oil	..	¼ fl. oz.	..
Water	70 fl. oz.	70 fl. oz.	70 fl. oz.
Butter	0·6 oz.	..	..
Lard	..	0·5 oz.	0·5 oz.
Salt	1·86 oz	1·86 oz.	1·86 oz.
Buckwheat	1·87 fl. oz.*	1·87 fl. oz.	1·87 fl. oz.

* Taken as a dry measure.

On the march 1¾ lbs. biscuit (24½ English oz.) instead of bread. Brandy only on rare occasions, calculated at 135 fluid ounces per year (in 5 oz. rations).

Poggiale, Chief Apothecary (Pharmacien Inspecteur) at Paris, has furnished the following Table, showing the percentages of nitrogen, and of nitrogenous compounds contained in the bread supplied to the Army of different nations.

States.	Nitrogen in 100 kilos. of Dried Bread.	Nitrogenous Compounds in the same.
France	2·26	14·69
Baden	2·24	14·56
Italy	2·19	14·23
Belgium	2·08	13·52
Holland	2·07	13·45
Wurtemberg	2·06	13·39
Austria	1·58	10·27
Spain	1·57	10·20
Prussia	1·12	7·26
England	Not stated.	

15. *Drink.*

Besides the above-mentioned three large water-basins, a good many delicious springs on both sides of the upper lake fill the wells of the next stationed troops. A steam-engine distributes this spring-water to all parts of the camp, every regiment is also furnished with a water-cart carrying one cask and drawn by one horse.

In regard to prepared drinks the men are supplied with the national "kwas," a decoction of malt seasoned with peppermint, it is a kind of beer with but a small percentage of alcohol, acidulated, bitter, and feebly aromatic; it is supplied to soldiers *ad libitum*, and is said to be more healthy than unmixed water; it quenches thirst eminently, and is considered as possessed of antiseptic properties. Therefore it is given in accordance with national belief and custom preferably to water in districts affected by fever or scurvy. This healthy, cheap, and beloved beverage is also adopted for the officers' mess rooms, and for hospitals.

Alcoholic drink is supplied only in exceptional cases, by order of a superior officer, after extraordinary exertions, or on festive occasions; in that case the soldier gets "krug" (5·4 fl. oz.) of brandy. The sale of brandy in the camp is prohibited; but for restoration after disease, and in the treatment of scurvy, brandy plays a prominent part among the Russian troops.

Every officer in command of an independent detachment of troops on the march has the power to order brandy for his men whenever the weather be cold or foggy.

Tea is another important favourite beverage of the Russian troops. In all northern countries, especially in coast districts, tea has become a popular drink; but especially in Russia it may be witnessed how tea serves as a heating and preservative agent, as stimulating digestion, and as an essential complement of all meals.

It is one of the chief advantages of the so-called "samovar" (self-cooking apparatus), a Russian tea urn, that it enables to procure at all times and localities, and for everybody, an easily made beverage. It is originally a small portative stove, the sides of which are formed by a vessel filled with water. It may be set up anywhere, and will boil quickly. Every officer is possessed of a "samovar," and never leaves it behind be he in camp, on the march, or in actual war. Most of the serjeants, and a good many of the married soldiers have such a "samovar" as their own property. In want of such a machine a private soldier prepares his tea in a tin coffee pot, and the companies possess in common for this purpose a larger mess kettle or "samovar." It is a highly useful invention, worth adopting, and appears recommendable also for soldiers of other countries. In the rest, tea is not officially supplied in the Russian Army; but patients or wounded may get tea on desire every morning and evening.

Coffee, which plays in the French Army the most prominent part, is comparatively unknown in Russia, although a Medical Officer has the power to order it for his patients; wine is only to be had in the dispensary and in the mess quarters of the officers.

The construction of a "samovar" is as follows:—

A cylindrical iron chafing dish tapering up in a flue, being wider below, and furnished with a grate and a receptacle for ashes, is surrounded by a hollow metallic vessel holding from 10 to 24 cupfuls of water or more, and covered by a ring-shaped lid through which the flue passes upwards. The tin vessel being filled with water, a few live coals are put on to the grate, more coals added, and the fire, gently fanned at first, soon brightens up and boils the water in a very short time. There is a tap for drawing off the boiling water, a vessel with milk when placed on the top of the lid gets warm at the same time, on the flue bread may be toasted, and in the water eggs may be boiled. Now Russian officers take tea twice or three times a day, the soldiers on evenings only. The men habitually gather round their common "samovar" on evenings in the free air under trees, half lying half sitting, forming a dense group the centre of which is the steaming flue of the "samovar." There they are sipping their tea, refilling their cups themselves from the tap, and enjoy a free lively conversation, frequently indulging in a song. Milk being of difficult access for soldiers is generally omitted, but not the sugar. Now and then the rind of a lemon

is used for flavouring the tea. On the march, and especially in war, the advantages derived from this apparatus to officers and men, besides superseding the desire for intoxicating drink, are inestimable, as in a hostile country frequently the villages are found pillaged by friend or foe before the troops arrive at their night quarters, perhaps after a long march in the rain. In such cases some hot tea and bread, if possible assisted by a few eggs, constitutes an excellent meal which everybody can easily and rapidly prepare.

16.—*The Dress of the Soldier.*

Notwithstanding the adoption of the type of uniformity, the Russian soldiers display in their dress manifold variations derived from climate, historic, or even peculiar causes.

The Russian soldier's head-covering is generally the cap, resembling the French or Austrian "Kaeppi." It looks much too light or thin for a northern climate; but it bears in winter time a good deal of padding (with cotton wadding), and is assisted by the cape. Ear-protectors were worn formerly by the whole Russian army; at present by the Cavalry only. They consist of padded flaps of cloth, tied together over the head by two crossed strings. Every Russian soldier is supplied with a "Baschlick"—a cape made of coarse camel's hair, which, when folded over the head, wraps up head, cap, and neck, and ends in two long flaps, which are crossed over the chest, passed under the arms, and tied to one another at the back. The material is rough, long-napped (for officers finer), and of an impermeable nature, to cause the rain to run off without penetrating.

On the march, the cape hangs down from the back, and its ends are passed under the shoulder-bands, and fixed crossing on the breast.

The Imperial Riflemen wear higher topped caps, with a broad band of fur all round.

The heavy Cavalry of the Guards wears ordinarily the old-fashioned broad-bottomed military cap, with downward-inclined shield (or ornament); but for parade they wear a metal helmet ornamented with the eagle. With reference to the latter head-dress, the same observation has been confirmed here as made in other armies, viz., that it favours or brings on baldness. Cossacks wear the national "Kiver"—a leather czako.

The tunic is generally adopted in the Russian army. It is made of strong rough cloth, pretty wide, and comfortably fitted, so as not to impede any movement of the body. It reaches nearly to the knee, has two rows of buttons, and breast-pieces folding one over another, so as to keep breast, belly, and thighs warm. Cossacks wear a tunic ("Kasakin") with folds, closed over the chest by a series of coloured catches.

Trousers are worn long and wide. In some regiments they are worn, as a rule, inside the tops of shining boots, which reach up to the knee, and are ornamentally cut out at the top. All troops wear the top boots inside the trousers; but whenever they march in rain or on moist ground, they put their trousers inside their boot-tops. This expedient is inducive to health, as it prevents the soaking of the trousers, besides preventing their wear.

A regiment marches more easily in exposed top-boots, and presents an infinitely better and more soldier-like aspect than in doubled-up trousers.

An essential part of the Russian soldier's dress is the great cloak, which, in the battle of the Alma, so much surprised the English. Made of rough but strong long-napped, mouse-grey cloth, reaching beyond the knees. It resembles a "sack paletôt," or great overcoat. Large enough to fit over a soldier's full equipment, it allows of being contracted about the waist from the inside by means of a string or tape. In time of war this paletôt serves a great many purposes: as a cloak, a morning coat, a bed-cover, a rain-protector. It is worn on the march in cold weather. All the men on guard, especially the sentinels in camp after 9 P.M., have to wear it. After rain, when the ordinary uniform is wet through, the paletôt alone is worn till the clothes get dry again. In battle, the officers wear their cloaks, which renders them undistinguishable to the enemy's sharpshooters.

In camp, linen trousers are worn exclusively, although the men have their set of woollen ones with them. It is known that the French have abandoned

their linen trousers entirely. Every soldier is moreover supplied with a short linen jacket (Kitteh), to do rough work, as, for instance, small drills, gymnastics, washing, gardening, &c.

In time of cholera, a cholera-belt was obligatory.

No army in the world is so well provided with boots as the Russian. It is a known fact that the Russians employ a special method of preparing the leather, rendering it thereby soft and durable. Excoriations, wounds, boils on the feet, in consequence of pinching or grinding of the boots, are nearly unknown.

The feet are very carefully and accurately wrapped up every time in strips of linen.

16. *Soldiers' Dress and Equipment.*

The full equipment of a soldier, which he has to carry on the march, is as follows (weighing 1 pood and $35\frac{1}{12}$ pounds=$75\frac{1}{24}$ Russian pounds, or $31\frac{1}{10}$ kilogrammes):—

	lbs.
Cap and ornament	$\frac{1}{2}$
Pouch with 60 rounds cartridge	$7\frac{1}{2}$
Belts without pouch and sword	$1\frac{1}{4}$
Pack straps	$1\frac{1}{2}$
Sword and scabbard....	$3\frac{1}{2}$
Rifle complete with bayonet	12
Pack	$7\frac{1}{2}$

Articles carried in the packs and over them :—

Outside—Mess tin	$1\frac{1}{2}$
Great coat	10
Inside—2 linen shirts	2
1 pair cloth trousers	$3\frac{1}{2}$
1 pair of boots..	$4\frac{1}{2}$
Drawers and linen for feet	$1\frac{1}{2}$
Brushes	1
Uniform with summer trousers ..	$4\frac{1}{2}$
Knife and scissors	$\frac{1}{4}$
Comb and looking glass	$\frac{1}{4}$
Screw-driver for rifle	$\frac{1}{4}$
Bashlik (hood)	1
Dress cap* worn in regiment (tschako)	$2\frac{1}{2}$
Bread and biscuit for three days ..	$5\frac{1}{4}$
Total .. Russian lbs.	$72\frac{3}{4}$=$63\frac{3}{4}$ lbs. English.

The bread for each soldier is ordinarily 3 lbs. a day, but on the march soldiers take with them biscuit weighing $1\frac{3}{4}$ lb. for the day; so that three days' provisions will be $5\frac{1}{4}$ lbs., instead of 9 lbs.

As all the Infantry, and the greater part of the Infantry Guards, wear their cap on all occasions, the $2\frac{1}{2}$ lbs. for "Tschako" may be deducted.

20. *Sanitary Establishments.*

Whenever a soldier is sick, he is treated according to his disease either in the lazaret of his regiment or in the hospital of Krasnoe Selo, or he is sent away to a military hospital in town. All patients suffering from chronic or infecting diseases,—especially syphilis, itch, acute skin disease, ophthalmia, are soon sent to town in order to prevent such diseases from spreading.

(*a.*) Lazarets.

The lazarets are chiefly ambulances, where patients are received in the first instance, closely examined, and their future destination determined upon. Severe cases receive their first attendance here, before sent further, or they remain a few days for observation. Therefore only the lightest and the most severe cases, which are not fit for transport, are treated in the lazaret. Every

* In camp the cap only is worn.

regiment, and several battalions of riflemen, are furnished with a lazaret, which is surrounded by a garden for patients to walk in the shadow of trees. A lazaret is a square wooden building, 82 feet long, 25 feet broad, or if the outer gallery is to be comprised, 87 feet long by 30 feet broad, and 23 feet high. The front, to which a kitchen is generally appended, measures 40 feet, *i.e.*, broader by 14 feet than the remainder of the building.

The floor is raised 2 feet from the ground. A wooden staircase leads up to and into the lazaret by the middle door, which leads to the entrances into corridor and ward-room, and to the quarters of the physician, surgeon, and apothecary.

The ward is 63 feet by 21 feet, and 14 feet high, and answers completely all the newer requirements of authors like Stromeyer. In the middle of the ward there is a passage left free, 9½ feet broad. The 17 beds on every side, with five windows between the beds, are placed with the head to the wall and the foot to the centre of the ward. Every two beds have a small night-table between them. Opposite the door is the fire-place, but no window, to avoid currents of air. For the same reason the window-sills are placed above the level of the beds.

There is no artificial ventilation. In fine weather the windows are freely opened, in bad weather the fires are lit.

The bedsteads are of wood, painted in oil, of the same colour as the tables. The walls are either papered or plainly plastered and smoothed. The bed is composed of a straw sack and straw mattress, two pillows, a blanket, and two sheets.

In the dispensary, the mostly used remedies are portioned off beforehand, otherwise the surgeon does the dispensing. In the dispensary is also kept the surgical travelling box, containing charpie, linen, bandages, tourniquet, a pocket instrument-case, and an amputation-case.

In every lazaret one physician is quartered; sometimes a second one resides in a tent or barrack;—but it is understood that very little provision is made in the camp to place the physician comfortably.

A transition to the lazaret proper is formed by the establishments for the weak (men reduced in strength).

No regiment is without a certain number of men who must be taken care o , either as convalescents, or from some other reason which does not bring them into hospital, but renders them unfit for service.

Those men, called the weak or feeble party, are kept in separate divisions, and certain districts in the neighbourhood of the camp are assigned to them. Every regiment has its district for the weak, in which the men enjoy near their regiments, being relieved from duty, country air and country life till they are restored to health and able to return to their duties. This arrangement is just as lenient to the men, as it is useful to prevent the overcrowding of the lazaret, and the presence of unsightly people in the camp itself. It has been in existence, to the benefit of the great camp (in barracks), for 30 or 40 years. Lately a similar arrangement has been introduced into the other camp under tents, viz., three stationary localities for slight illness which allow of being treated in tents. Not far from a lazaret, at three different places in the camp, are from one to three tents, in which light complaints may be treated, and in which convalescents may recover under medical inspection. Every convalescent, after a severe illness, receives, on leaving hospital, from his Superior Medical Officer a certificate which entitles him to a leave of absence from his regiment for a period of from three to seven days.

I had an opportunity in 1865, at Stettin, to notice the advantageous employment of tents for patients. On the short cut grass of the ramparts of the fortress two double tents had been pitched as a lazaret for sick soldiers. Each tent contained 13 beds, with a night-table to each bed, a metal bathing basin, a table, and a commode of Müller-Schür's system. In a small third tent the dressers were quartered. During several months, acute cases had been treated in these tents with success,—especially typhus cases received treatment according to Brand's hydrotherapeutic method, by affusion of cold water, and by exclusion of all other remedies besides water. The duration of the fever was shortened, and only 4 per cent. fatal cases occurred, and those through complications.

6. *The Hospital.*

In the middle of the village is the principal hospital for the use of all the troops in the camp. It is opened for the summer only in the beginning of May, and closes at the end of August, and is intended to take in acute diseases only. It is constructed of beams, not of boards, like all other barracks, which are plastered over and painted. It consists of two separate one-storied buildings, the front building being an old one (upwards of thirty years) of angular, old-fashioned construction, too much shaded by tall shrubs and trees, looks gloomy, and does not answer the claims which are justly made at present to an hospital. It is understood to be assigned already for pulling down and re-construction. It contains numerous large and small wards, besides offices and registry office. The building at the back, of more recent date, contains two wards of twenty beds each, and is more accessible to the rays of the sun, free air, and is generally drier and of better preservation.

Medical and surgical cases are kept separate. Whenever isolation is required, in cases of gangrene or pyæmia, &c., tents are ready at hand to be pitched in the garden of the hospital. Ten beds in separate rooms, in the front building, are reserved for officers, although it is optional to them to be treated in their own quarters or in Petersburgh, or they get leave of absence according to the degree of their illness. The bedsteads, formerly of wood, have been replaced since 1865 by iron ones. Ventilation is confined to the opening of windows and the fire in the stoves. For all that, the air is tolerable (not bad), perhaps somewhat moist in the front building. The cleanliness in the hospital is unimpeachable. Linen is changed at the option and order of the physician. As a matter of course, every bed becoming free is re-furnished with fresh linen; and once a-week body and bed linen are changed. At every morning visit, the Medical Officer has laid before him, for signature, a list of the daily prescriptions, of the diet, and of the washing, in which he may note *ad libitum* what he thinks requisite. He is thus enabled to order fresh body and bed linen even every day, to patients after operation, or affected with sloughing wounds, &c. The Inspector issues directly all that the Doctor has prescribed.

The kitchen is in a separate building on the premises of the hospital. Military cooks prepare the meals in an excellent style, as in all Russian hospitals and military kitchens. Here, as in the army generally, patients have three kinds of diet, full diet being equal to a healthy soldier's, viz., 3 lbs. of bread, ½ lb. of meat, schtschi and gruel of buckwheat, observing the rotation as to meat days and fast days. But they have here a third kind of diet, called "anti-scorbutic full diet," which is ordered in all antiscorbutic treatments, and consists in an addition of pepper, horse-radish, leek, and other spices to the "schtschi" soup, and in replacing the vegetables by raw saurkraut (sour cabbage), with onions, leek, horse-radish, and vinegar. To all full diets belong 4 lbs. (56 ozs. Eng.) of "kwas" (small beer) per day.

The half diet consists in soup twice a-day, and 1¼ lb. of white bread, either with or without meat (according to meat days or fast days).

The third diet consists in oatmeal soup twice a-day, and ½ lb. of white bread, and tea once a-day. Instead of oatmeal soup, the doctor may change every day with potato soup or groats soup (called "manna"), decoction of prunes, or boiled milk (4 lbs.) or red gruel ("kissel").

Essentially different is the diet for sick officers, consisting of beef tea, cutlets with potatoes, roasted meat, boiled groats (manna grits), in addition to white bread and kwas. The Doctor may, at his option, make any variation in those named diets, and may prescribe extras, as eggs, fowls, jam, &c., in any quantity.

Every patient, on his admission, is placed for 24 hours on third diet. Another diet, if desirable, is prescribed next morning by the Medical Officer of the division. Scorbutic patients get directly antiscorbutic diet, besides half a lemon, and frequently some aromatic brandy ("liqueur"). Officers' diet is given in exceptional cases to patients and convalescents who require strengthening diet, but cannot digest the rather heavy full diet; but the brown bread in the latter makes it rather more attractive than even officers' diet (with white bread); and many patients meet with a relapse, or an intercurrent gastric indisposition by secretly purchasing brown bread of their neighbours.]

The meals are good; the material is of first quality; the mode of preparing is attentive and tasteful; the arrangement of meals is also suitable. One observation only is to be made, viz., the potatoes recur comparatively rather frequently, although they are universally liked by the men, and are essential on fast days; but eaten in excess they do not agree with a healthy man, so much the less will they benefit a patient, especially when they have not turned out well, as was the case last year; then they are positively unwholesome.

Several physicians here believe, from their observations on patients, that potatoes are liable to cause indigestion. It were desirable that potatoes formed a less stationary article of our hospital diet (the officers' diet has roasted potatoes), especially in summer time, when old potatoes are getting stale, and new ones not yet in season.

In a separate building on the premises is a dispensary, where two dispensers make up the daily prescriptions, and issue also brandy, wine, milk, lemons, &c.

The hospital is under a Principal Medical Officer and three or four physicians, each of whom has the care of one division, and, in rotation, one of them is on duty for 24 hours. At 8 A.M. the Principal Medical Officer makes his visit all over the hospital, the patients in each division being brought before him by the Acting Medical Officer. The Medical Officer on duty must always be in full uniform, as it frequently occurs that the Emperor or other competent persons visit the hospital.

As dressers, soldiers are employed under the control of serjeants. All of them serve under the Inspector, who is a person of higher military rank (as Major).

When the patients leave hospital they get their own clothes and linen handed out to them; also their private property, as money, watches, &c. Moreover they are questioned by the officer on duty, whether they have received all their property, and whether they have any complaint to make. They have thus an opportunity to bring forward any complaint they think fit. Provision for brothels, as in the camp at Chalons, is not made at Krasnoe Selo.

20. *Medical Staff.*

To every Infantry regiment are attached one Senior and three Junior Medical Officers; to every Cavalry regiment, one Senior and one Junior; but as the full Medical Staff does not follow the troops into camp, the number of Surgeons in camp is not certain. The Principal Surgeon remains generally in the Hospital of Petersburgh. On manœuvring or marching days, one Medical Officer only per regiment, or fraction of a regiment, follows in person. He brings with him an ambulance wagon and a surgical travelling chest, containing a small dispensary, instrument case, bandages, and splints. On grand occasions he is accompanied by a "Feldscheer" (serjeant dresser), and treats any case occurring in a tent pitched for the day. On the final review, the Principal Medical Officer of the corps (30,000 men) and his deputy are in attendance.

The Principal Medical Officer signs all daily reports about the sick in hospital or lazaret of the camp, and sends them to the "Grossfuerst" (Crown Prince), being the Commander-in-Chief of the Camp.

In 1864, 57 Surgeons of all ranks were in the camp.

To every regiment is attached an equal number of dresser serjeants to the Surgeons, for the performance of cupping, bleeding, setting leeches, giving medicines, &c. They are instructed in special establishments for duty.

21. *State of Health in Camp.*

The favourable influence of the camp on the health of troops has been confirmed by an experience of 40 years. There has never been an independent epidemic in the camp; of course it was impossible to avoid cholera when this disease did its ravages all over Europe, and had a strong hold on Petersburgh.

In 1861, an epidemic "infecting conjunctivitis" made its appearance in camp, but was very mild, owing to a proper distribution of the troops. Scurvy and scorbutic disposition disappear, according to a 10 year's observation, as soon as the troops move into camp. The state of health among the troops in camp in the year 1864 was exceptionally favourable, there being only one in 24 sick. In 1862, at Chalons, the proportion was one in 18½, leaving in both

cases out of account the number of sick which the regiments left in the hospitals of the town. That makes 5.5 per cent. for Chalons, and 4 per cent. for Krasnoe Selo; at the same time it must be admitted that—

1. The number of the French troops in camp is not half that of ours, consequently they are less on the same area.

2. Our camp time falls in a less favourable season, and under a rougher climate than that of France. Especially last year all exercises and reviews happened to be on rainy days. Nevertheless the state of health improves from the first day in camp. Not the smallest advantage of the camp consists in its allowing the barracks and hospitals in town to remain empty for a time, and to undergo a thorough repair and ventilation.

Concluding Remarks.

The camp at Knasnoe Selo having furnished so very favourable sanitary results that they may well be placed side by side of the results of the camp at Chalons, which Larrey, Perier, and Roth have deservingly praised. Those results deserve so much the more to be noted, as the camp at Chalons is of much newer construction (having been erected 10 years ago, according to recently much improved principles; whereas the camp at Krasnoe Selo having been constructed 40 years ago, and its architecture, and interior arrangement being old, had to undergo a continual renovation and improvement.

The essential points to which those favourable sanitary results must be attributed are as follows:—

1. Chiefly the happy choice of the locality, the favourable conditions of the soil, a delicious pure air, and a sufficiency of good drinking water.

2. The judicious use, and laying out of the locality as proved by the establishing of the whole camp on a sloping surface by the drainage of the soil and the making of numerous gardens inside the camp.

3. Excellent food. The good quality of the food is owing to the practical and good administrative institutions in general, and in particular to that institution in the Russian army, that the recipient is allowed to have a voice and control over what is supplied to him, and especially to the interest which the authorities and the Imperial Family take in this branch of the administration.

4. The exquisite cleanliness in all branches of camp life, especially the cleanliness of the body, is stimulated by the facility of taking frequently a steam bath, and by the plentiful existence of cold water in the camp.

5. The separation of Cavalry from Infantry, rigidly carried out on the large as well as on the small scale, and also the separation of the horses from the men.

6. The extensive liberty the men are allowed to enjoy during their free time.

7. The plentiful supply in the camp of Medical Officers and sanitary institutions.

8. The perfection of the whole administration.

9. The moral condition of the troops.

The Guards are composed of chosen troops only, of men well conditioned, healthy, and not too young, consequenly better drilled and hardened. They are animated by the best military spirit. With Russian troops, the soldier's attachment to his military chief is heightened by the national devotion, approaching to tenderness and veneration, towards the Emperor and his family; therefore all military proceedings in the camp, whenever the "Grossfuerst," as Commander-in-Chief, or the Emperor himself, takes part in it, assume the type of festive occurrence, and are carried out with an enthusiasm which has not its equal.

Another national faculty of which the Russian as a soldier avails himself whenever living in camp or war, and which helps him to keep up his health and good spirit, is his ability to shift for himself and to dispense with comforts. His pretensions as to lodging or at table are easily satisfied.

The whole nation, high or low born, on their travels and migrations though the vast empire, have no objection to lodge and sleep in their carriages, to struggle against frost, to suffer hunger or thirst, bear discomfort and fatigue

without grumbling, but also without bad consequences, as everywhere, by means of their "samovar," they establish a home; to use their furs as a bed as well as a cloak. In the same way the Russian soldier is peculiarly gifted to live with or without tents, to sleep, eat, and preserve his health and good spirits more so than any other. This is no doubt one of those national characteristics which has ever enabled Russians to be capital soldiers.

Russian Weights.

1 Pud = 40 Russian pounds, or 35 English pounds.
1 Russian pound = 14 English ounces.
1 Solotnik = $\frac{1}{3}$ ounce.

Russian Measures for Liquids.

1 Wedro = 12$\frac{1}{4}$ French litre.
1 Litre = 35·2 English fluid ounces.
1 Garnatz = $\frac{2}{3}$ litre = 23·25 fluid ounces.

Russian Measures for Length.

1 Werst = $\frac{2}{3}$ English mile.
1 Faden = 7 English foot.
1 Russian foot = 1 English foot.
1 Werschock = 1·71 English inches.

APPENDIX No. XVIII.

ON THE COMPARATIVE USE OF CERTAIN DRUGS IN THE ARMY AT HOME.

THE failure of the ordinary methods in use to check the steadily increasing expenditure for medicines and medical and surgical appliances, and the freely expressed opinion of many experienced officers, that such increase was in many instances attributable to causes in no way connected with the medical treatment or remedial requirements of the sick, led in January last to the promulgation of the following circular:—

"ARMY MEDICAL DEPARTMENT,

"SIR, "1*st January*, 1869.

"1. IT having been represented by several Principal Medical Officers and others, that there is undue expenditure of Medicines, Surgical Materials, and Dispensary Sundries used in Army Hospitals. Medical Officers in Charge will be good enough to personally supervise the issues under these heads.

"2. At the periodical Inspections, Principal Medical Officers will minutely examine the Prescription Books, to see that all articles used in the Hospital, or issued to patients out of Hospital, have been duly and properly entered, that the persons so prescribed for are entitled by the Regulations to medical aid at the public expense, and that the totals of the ingredients in the prescriptions correspond with the quantities expended from the Surgery Stores. For this purpose, detailed abstracts of the prescriptions written in the intervals of the Inspections should be prepared by the Hospital Serjeant, and verified by the Medical Officer in Charge.

"3. Principal Medical Officers are required to see that where less expensive preparations are as efficacious, and as suitable as more expensive articles, the cheaper remedy is employed.

"4. In forwarding Returns of Medicines, &c., the Medical Officer in Charge will personally examine the same, verifying the quantities in the columns "expended" and "remaining," with the expenditure according to the Prescription Books, and the quantities actually remaining on hand; and the Principal Medical Officer will, at the next Inspection, satisfy himself that this has been done.

"5. Before approving a Requisition for a further supply, the Principal Medical Officer will take steps to ascertain that there is no undue accumulation of any article in store, and that each item indented for will probably be required in the quantity demanded.

"I have the honor to be,

"SIR,

"Your obedient Servant,

"T. G. LOGAN,

"*Director-General.*"

As the necessity for and expediency of this measure have been questioned, and as nothing short of a willing and efficient co-operation on the part of those to whom it is addressed can control the undue expenditure alleged to exist, and for which it suggests a remedy, it has been deemed advisable to publish a table shewing the actual consumption of those drugs more commonly issued to the various regiments and corps serving at home, during the year embraced in this report.

The returns of medicines expended are made out from April to April, and not from January to January in each year; but this will not materially affect

	1st Life Guards.	2nd Life Guards.	Royal Horse Guards
	lb. oz.	lb. oz.	lb. oz.
Iodum	0 3	0 4	..
Ipecacuanha	0 2	...	0 2
Jalapa	0 8	.	.
Lini Farina	124 0	178 0	80 0
Liniment: Saponis	12 2	4 0	12 0
Liquor Ammoniæ	2 0	1 1	4 0
——— Acetatis	8 0	3 0	0 8
——— Arsenicalis	0 5	0 0½	0 4
——— Plumbi Subacetatis	8 0	2 0	0 2
——— Potassæ	1 0	0 8	2 0
——— Sodæ Chloratæ	...	2 8	1 8
[——— Styptic]	.	0 1	.
——— Zinci Chloridi	7 0	4 0	4 0
Magnesia	...	...	...
Magnesiæ Carbonas	3 0	4 0	.
——— Sulphas	4 0	32 0	8 0
Morph: Hydrochloras	0 1	...	0 0
Ol: Anisi	0 1	0 0½	.
— Crotonis	0 1	0 0½	..
— Menthæ piperitæ	0 2	0 1½	0 1
— Morrhuæ	60 0	42 0	48 0
— Olivæ	20 0	6 0	7 0
— Ricini	45 0	24 0	24 0
— Terebinthinæ	10 0	4 2	8 0
Opium	0 2	0 2½	0 2
Pilula Hydrargyri	1 4	0 1	0 1
——— Hydrargyri Subchloridi comp:	.	0 5	0 1
——— Rhei composita	1 0	0 14	0 12
Plumbi Acetas	...	0 10	0 1
Potassæ Acetas	0 12	0 2	1 0
——— Bicarbonas	8 0	5 8	4 4
——— Tartras Acida	4 0	...	...
——— Chloras	0 11	1 0	.
Potassa Caustica	..	0 0½	..
Potassæ Nitras	1 8	1 0	1 0
Potassii Iodidum	6 0	1 12	2 0
Pulvis Antimonialis	..	0 2	..
[——— Jacobi]	0 2	...	...
——— Cretæ Aromaticus	1 0	0 6	0 2
——— Cretæ Aromaticus cum Opio	1 0	0 5	0 6
——— Ipecacuanhæ comp:	0 12	0 12	0 9
——— Kino comp:	.	0 6	.
Quassiæ Lignum	1 0	0 3	..
Quiniæ Sulphas	1 0	1 2	0 11
Rhei Radix	2 0	1 0	0 2
Scammonium	0 4	0 0½	0 1
Scilla	0 9	0 1	...
Senna	3 0	.	.
Sinapis	18 0	28 0	..
Sodæ Bicarbonas	10 0	8 0	3 8
Soda Tartarata	3 0	10 0	4 0

the results in the opinion of anyone who may wish to contrast the expenditure of medicines in different corps with the strength, sickness, and mortality in each respectively, as shewn at page — and in other portions of the volume.

The selection of the corps included in the following table has been determined entirely by the fact that they shew an uninterrupted expenditure for the whole corps for the period embraced in the table.

In many instances, regiments are so broken up into detachments that it is not possible to shew the total expenditure of each detachment in one return; while other regiments, serving at certain stations, and drawing their supplies from local dispensaries, do not furnish special returns of expenditure in such a form as to admit of their being included in this table. The services selected are sufficiently numerous, however, to give a fair idea of the relative expenditure of drugs by different Medical Officers in the treatment of a given number of sick under circumstances as nearly similar as possible.

These tables have been compiled mainly for the purpose of calling attention to the aggregate quantities of certain drugs expended by the Medical Officers of different corps. Should their examination lead to a more careful study of the relative value of particular remedies which are in much repute with some officers, but apparently never or rarely used by others, a further and even greater advantage, namely, a reduction in the actual number of drugs deemed essential for the treatment of the diseases of soldiers, will probably be attained.

APPENDIX No. XIX.

ARMY MEDICAL SCHOOL, NETLEY.

The 17th Session, or Winter Session of 1868-9, was attended by 21 candidates for the British, and 10 for the Indian Medical Service.

The order of precedence in which the candidates for the two services were eventually arranged to be Gazetted was fixed according to the combined results of the two examinations, and is shown in the lists which follow.

The questions put at both examinations, at Chelsea and Netley, are also given.

The Herbert Prize, which is open to both services, was awarded to Dr. K. M. Downie, Indian Service.

SEVENTEENTH SESSION.—WINTER 1868-9.

COMBINED RESULTS of the Chelsea Examination in August 1868, and of the Netley Examination in February 1869.

NAMES of Candidates for the British Medical Service, arranged in Order of Merit, with the Total Number of Marks.

Order of Merit, as finally settled.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit as finally settled.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)
1	Chatterton, J.....	5,465	12	Duke, A. W.	3,766
2	Stokes, A. H.....	4,863	13	Bradford, R. M...	3,763
3	Triphook, G. R...	4,708	14	Stannard, H.	3,621
4	Saunderson, W. H.	4,553	15	Thornley, J. G. ..	3,620
5	Scanlan, J:.....	4, 533	16	Maxwell, E. C. ..	3,525
6	Crean, J. J.....	4,461	17	Webb, J. H.....	3,520
7	Corry, G.....	4,128	18	Bennett, R. D. ..	3,463
8	Davy, F. A.....	3,918	19	Faris, T.....	3,448
9	Adye-Curran, F. G.	3,888	20	Sharpe, W.	2,998
10	Maunsell, H. E...	3,788	21	White, H. B.	2,913
11	Carroll, T. E.....	3,783			

COMBINED RESULTS of the Chelsea Examination in August 1868, and of the Netley Examination in February 1869.

NAMES of Candidates for the Indian Medical Service, arranged in the Order of Merit, with the Total Number of Marks.

Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)	Order of Merit.	Names arranged in Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900.)
1	Downie, K. M. ..	5,745	6	Johnson, E. R. ..	4,676
2	Mackenzie, F. M..	5,183	7	Wright, W. E....	4,535
3	Lupton, A. W....	4,930	8	Robb, J.	4,388
4	Mac Gregor, J. ..	4,768	9	Kiernander, W. C.	4,278
5	Hutcheson, G. ...	4,735	10	Blenkinsop, F. H.	4,018

CHELSEA EXAMINATION, AUGUST 1868.

ANATOMY AND PHYSIOLOGY.

1. What spinal nerves enter into the formation of the cervical and sacral plexuses? Describe the general arrangement of the nerves in each plexus, and enumerate those proceeding from it.

2. Describe the urinary bladder, and its relations to the immediately surrounding parts; the differences of relation it presents in various degrees of fulness, and at different periods of life; the arrangement of its muscular fibres, and the character of the epithelium by which it is lined.

3. Describe the structure of the spinal chord (below the medulla oblongata); and state what has been determined experimentally with regard to the transmission of sensory and motor impressions through it.

4. Describe the prostate, its relations and structure.

5. Mention the varieties in the origin and course of the blood vessels, to be regarded in the operations of laryngotomy and tracheotomy.

6. State the peculiarities of the blood in the hepatic, renal, and pulmonary veins respectively.

SURGERY.

1. What would be the immediate symptoms, physical and general, in a case, in which fracture of three or four ribs, with laceration of the lung, had occurred on the right side; and what would be the changes observed in the symptoms, under a favourable progress? Describe the treatment to be adopted throughout

2. A man was wounded by a rifle bullet, which entered at the anterior margin of the deltoid muscle, and passed out behind the shoulder; in its course it comminuted the head, as well as an inch and a half of the upper extremity of the humerus. State what treatment should be pursued in such a case, and what would be the probable result.

3. A boy, in attempting to walk on the top bar of a rail-fence, slipped, and fell across it, striking the perinæum; shortly after much swelling and discoloration of the part was observed; nor could urine be passed when the desire to empty the bladder became urgent. State the nature of the injury, the treatment to be adopted; and what, usually, is the ultimate result of such an accident.

4. Describe the symptoms, and course of a case of scrofulous disease of the

upper cervical vertebræ (1st to 4th). At what period of life does it usually occur, and what are the pathological changes observed after death?

5. Describe the symptoms of stone in the bladder. What are its pathological effects on the bladder and kidneys, if not removed? Under what conditions should the operation of lithotomy, or lithotrity, be preferred?

6. Describe the symptoms, and results of syphilitic iritis, if neglected. What treatment should be pursued to arrest its progress?

Medicine.

1. Give an account of the malarious fevers, including the presumed causes, the symptoms, and the treatment.

2. Give the stethoscopic signs of the following diseases:—pneumonia; pleurisy, with effusion; hydro-thorax; pulmonary apoplexy; coincident constriction and potency of the cardiac mitral opening and similar conditions of the aortic orifice.

3. What do you mean by the terms anæmia, chlorosis, and leucocythæmia? Describe carefully the state of the blood; the condition of the various organs, and give the treatment in each case.

4. Mention the chief conditions of the urine which are important for diagnosis, and describe a case of acute morbus brightii in an adult man.

5. For what purposes are conium, belladonna, and henbane used in medicine? Mention the chief pharmacopœial preparations, and state what is known about the action of the active principles.

6. What are the chief diseases which may come on in the first week after confinement? Give the chief symptoms, and, briefly, the treatment.

Natural History, and Physics.

i. Zoology.

1. Enumerate the principal varieties of the human race, and state their distinctive characteristics and geographical distribution.

2. Describe the principal modifications in the form and arrangement of the placenta, and state how far its various forms are useful in classification.

3. Give the characters of the class cœlenterata; mention its primary divisions, and name a genus belonging to each.

4. What is meant by spontaneous generation? Give some account of the experiments which have been made to prove or disprove it, and of the arguments that have been used for and against it.

5. Give an account of the geographical distribution of some of the larger divisions of the Mammalia.

ii. Botany.

1. Give an account of the process of impregnation in phenogams.

2. Describe the structure and functions of leaves.

3. Contrast the reproductive process in ferns and mosses.

4. Give the natural character of grasses and cyperaceæ, pointing out where they agree and differ.

5. What is the geographical distribution of the following families of plants?—

Proteaceæ;
Melastomaceæ;
Magnoliaceæ;
Umbelliferæ;
Ranunculaceæ.

iii. Physics.

1. Describe the way to make a thermometer. How do Fahrenheit's, Reaumur's, and the Centigrade Thermometers differ, and how can observations made with any one of them be converted into the other scales? What precautions are necessary to get the true temperature of the air.

2. What are the different hygrometric conditions of the air? What is saturation and the dew point? Describe the kinds of hygrometer in common use.

3. Explain the cause of the trade winds, and of land and sea breezes.

4. Give an account of the arguments employed to show the convertibility of light into heat, and *vice versâ*.

5. What is coal geologically and physically, and what are the principal products of its distillation?

6. Describe the process of brewing, and the theory of fermentation.

NETLEY EXAMINATION, FEBRUARY 1869.

Held at the close of the 17th Session of the Army Medical School.

A. Written Examination.

I.—Hygiene.

1. What amount of fresh air per hour ought to be supplied for an adult? What are your reasons for stating this amount? How would you ascertain the direction and extent of the movement of air? What are the chief impurities in air, and what are supposed to be their effects? How would you examine for them?

2. What amount of labour is undergone by the soldier in time of peace? How would you estimate this if you were required to give a numerical expression for it? How does the labour performed on a march of 20 miles with and without weights compare with the labour of a common mechanical trade?

3. Contrast the diseases and the mortality of the West and East Indies, and state what precautions are necessary for the prevention of yellow fever and cholera respectively.

II.—Pathology.

1. On the occurrence of an epidemic of fever (such as recently prevailed at Malta and the Mauritius) the phenomena of which fever did not conform to the phenomena of other known fevers, what are the systematic investigations of a clinical and pathological kind which you would institute to determine the nature of the fever, its course, and its duration?

2. Since 1838 it has been every now and again asserted that the stools of cholera during a certain stage of the disease contain forms of fungi in great abundance; the same has more recently been alleged of other diseases. It has been also alleged that such fungi constitute the "contagium" of the disease.

Name (and describe sufficiently to identify) the elementary structures of microscopic fungi.

The use of certain reagents is absolutely necessary to distinguish fungi; therefore name the best reagents, and state their uses, mentioning, at the same time, the forms or substances (organic or inorganic) with which the microscopic elements of fungi may be confounded.

3. Private Michael Mulcrone, aged 33, had completed 10 years' service, and was admitted to Netley from on board ship from India on the 14th November, 1868. He had served for four years in the East Indies, and four years at the Cape of Good Hope.

On admission at Netley he was sent to the Surgical Division for syphilitic rupial ulcers of the body and extremities. But on the day following his admission he was transferred to the Medical Division with the following symptoms namely, dyspnœa with severe pain in the left side, accompanied by the expectoration of pneumonic sputa. There were also present, thirst, flushed cheeks, heat of skin (temperature 102·3), and quick pulse; dullness on percussion over both lungs, especially posteriorly; pleuritic friction sounds, and small crepitations heard on the left side with inspiration.

On the third day after admission there was increased dyspnœa, difficult

expectoration of tenacious rusty-coloured expectoration, with an evening temperature of 103·8.

On the sixth day after admission the temperature fell to 99·4°, and respiration was less difficult.

On the eighth day the respiration again became hurried, the cough more frequent and harassing, great thirst, large and small crepitant râles were heard over both lungs posteriorly.

On the ninth day there was great restlessness, the respirations were 42 per minute, the pulse 135, with a temperature of 102·1° ; abundant expectoration of purulent sputa.

On the tenth day the respiration became more difficult and more hurried, perspiration profuse ; temperature 102·1°, pulse very rapid, with lividity of countenance.

On the eleventh day he was sinking ; pulse 138, intermittent, respirations 48 per minute, a temperature of 103·2°, and at midnight he died.

1. What were the evidences of syphilitic lesions ? (*a*) on penis ; (*b*) skin ; (*c*) lymphatic glands ; (*d*) testicles.

2. What were the lesions seen in the tonsils and fauces, larynx and trachea, and connective tissue surrounding the œsophagus ?

3. What were the lesions seen in the pleura and the lungs and the liver ?

4. Write a commentary on the whole case, first, in relation to the syphilitic lesions ; second, in relation to the lesions associated with the symptoms immediately preceding death.

III.—Military Surgery.

1. Describe the leading characteristic features and general treatment of incised, punctured, and gunshot wounds as they are met with in warfare.

2. Explain the successive steps of the process by which you are enabled to determine that the refractive quality of the eyes of a soldier sent to you for examination is perfect ; or, if found defective, how you establish the kind and degree of defect which exists in them, or in either of them.

3. (*a*) Give a sketch of the system on which diets and extras are ordered to patients in military hospitals.

(*b*) Mention the names of the diets in the authorized scale.

(*c*) State the composition of any one of them.

IV.—Military Medicine.

1. What are the types of fever usually seen in unsanitary camps and garrisons ? Describe them, and the mode in which you would deal with them as regards prevention and treatment.

2. A. B., a soldier, aged 40 ; 17 years' service, 10 of which were passed in India, presented himself at Netley in the following condition :—

Is thin ; has a sallow anæmic complexion, but is not jaundiced. No anasarca or ascites ; abdominal veins not enlarged ; appetite bad or capricious ; suffers from indigestion and severe diarrhœa from apparently slight causes,—the motions being large, watery, frothy, voided with violence, but without pain, and having no dysenteric odour. His Medical History Sheet shows that he suffered from syphilis in England before going to India ; from the same disease in Bengal, both in its primary and secondary forms ; from repeated attacks of intermittent fever, and from long-continued dysentery.

On examination, the respiratory and circulatory systems are found to be fairly normal. The liver extends as high as the right nipple, and downwards to the level of the umbilicus ; its consistence is firm without being indurated, smooth, not elastic, painless ; the gland is reported to have attained to its present size slowly, and there is no history of previous hepatic inflammation. The only complaint made is of a sensation of weight and fulness, and inability to lie on the left side. There is some enlargement of the spleen. The urine is above the normal quantity, pale, of low specific gravity, and contains albumen and hyaline casts. Although not noted as an intemperate soldier, the patient admits that in India he daily consumed more than his spirit ration.

What is this man's disease, and how would you treat it?

3. Give the diagnostic points—

(*a*) of abscess;
(*b*) of hydatid tumor;
(*c*) of fatty enlargement;
(*d*) of cancer of the liver; and

the treatment of the two first conditions.

B. Practical Examination.

Military Medicine and Surgery.

Examine the case of

Write concisely a history of the case,—your diagnosis, prognosis, the probable effects of treatment, and the influence of the disease (or injury) on the man's fitness for service as a soldier.

Military Hygiene.

(*a*) Examine the specimen of water before you,—as much as can be done in the time.

(*b*) Determine the amount of gluten (weighed wet).

(*c*) Examine the flour before you, chemically and microscopically.

Pathology.

Practical Examination.

1. Examine the fluid in the test-tube, and name the vegetable structures contained in it. State how you have distinguished them.

2. Examine the portions of viscera placed in the dishes. State of what organ each is a part, and describe its morbid condition.

3. Name the parts of the body shown in the preparations numbered respectively 1, 2, 3, 4. Describe the lesion or lesions which each of them illustrate.

4. Determine the magnifying power of *any one* of the microscopes, and append the scale used.

EXAMINATION OF ASSISTANT-SURGEONS PREVIOUS TO PROMOTION.—JANUARY 1868.

Surgery and Surgical Anatomy.

1. Write what you know about recent improvements in the treatment of wounds, particularly those for preventing the occurrence of suppuration, and obtaining union by the first intention.

2. Describe the operation of plugging the posterior nares in a case of epistaxis.

3. A bullet has lodged in the elbow-joint, and excision of the joint has been determined on. Describe the steps of the operation and the after-treatment.

4. Mention in their normal order the structures successively divided by the knife in performing the lateral operation of lithotomy.

Medicine.

1. Give an account of the phenomena of cow-pox on the human subject, describing the local characters of the vaccine disease, including the diagnosis between *true* and *spurious* vaccination.

What are the conditions which interfere with the regular course of the vaccine vesicle?

What is the rate at which unvaccinated persons, affected with small-pox die, and the death-rate among those vaccinated, under similar circumstances?

What kind of a cicatrix on the arm of a recruit would satisfy you that it was the result of a genuine vaccine vesicle?

2. Give a concise statement of the symptoms (*a*) of the first, (*b*) of the second, and (*c*) of the third stages of syphilis.

3. Typhoid fever having appeared in your regiment, describe the means you would adopt to extirpate it.

PATHOLOGY.

1. State your views relative to the pathology of insolatio or sun-stroke.

2. Define the lesions sometimes classified under the name of "Hepatitis."

3. Write a pathological exposition of the following case, explaining especially its nature, the probable mode of death, and the *post-mortem* appearances in the chest:—

"A tall, active, well-made soldier, 30 years of age, about two or three "months before his death complains of flying pains about the walls of the "chest on both sides, which are believed to be neuralgic. Several weeks after-"wards the character of the voice becomes stridulous, the neuralgic-like pains "become worse, and the breathing asthmatic.

"An examination of the chest discloses an increase in the extent and "clearness with which both sounds of the heart are heard over the left side of "the chest over the apex, and especially towards the sternal end of the left "clavicle.

"There was no cardiac, nor aortic murmur, no swelling, and no extended "nor increased impulse; and no perceptible dullness on percussion.

"At the apex of the left side of the chest posteriorly, the breath sound "was of a marked tubular character; and there was no diffused respiratory "murmur audible either in front or behind at the apex of the left lung. "The sounds towards the base of the lung were normal. The pulse at the "left wrist was smaller or more feeble than that at the right wrist. There "was no tenderness on pressure anywhere, and he could lie in any position "with equal ease. Swallowing liquids or solids gave him no trouble. The "pains were worse at night.

"In other respects the man felt so little ill that he did not consider he "required care in hospital; but he soon became sallow and ill, and the "breathing difficult when he ascended a stair. His death was soon and "sudden."

Diagnose the case. Describe its nature and the probable mode of death, and the *post-mortem* appearances as to the heart, aorta, and thoracic viscera.

HYGIENE.

1. What are the chief causes of mortality in the army on home service, and what suggestions can you make with a view to their removal?

2. What are the sanitary duties in camps, and what diseases at home or in the tropics are liable to arise from foul camps?

3. What are the constituents of milk, and how would you determine the quality of any sample on which your opinion is asked?

EXAMINATION OF ASSISTANT SURGEONS PREVIOUS TO PROMOTION.—JANUARY 1869.

[This examination was vitiated in consequence of the premature promulgation of the questions at one of the Foreign Stations. It was therefore set aside.]

SURGERY AND SURGICAL ANATOMY.

1. (*a*) What are the usual conditions of joints, which are said to be "stiff joints," after strains or other mechanical injuries?
   (*b*) What steps ought to be taken to prevent these conditions?
   (*c*) When they have occurred, what are the most effective modes of removing them?

2. (*a*) Name the conditions following injuries to the chest which render the operation of *paracentesis thoracis* necessary.
(*b*) Give an account of the circumstances which would determine in your mind the proper period for its performance.
(*c*) Describe accurately the proper way of performing the operation.

3. What are the tendons and ligaments to which the preservation of the arch of the foot is principally due.

4. Does your experience enable you to suggest any improvements in th equipment laid down in the medical relations for field hospitals? If so, wha are these improvements?

MEDICINE.

1. Give the symptoms, duration, and progress of cancer of the liver, also the chief points of diagnosis between this disease and (*a*) amyloid liver, (*b*) syphilitic liver, (*c*) hydatid cyst, and (*d*) hepatic abscess.

2. Give a description of the symptoms, progress, duration, diagnosis, and pathology of progressive locomotor ataxy.

3. Give the best account you can of the typhus of armies, its causes, symptoms, treatment, and best modes of prevention.

HYGIENE.

1. In the case of a regiment being attacked with yellow fever in the West Indies, what measures would you recommend in order to prevent the spread of the disease?

2. What are the diseases which have been supposed to be connected with imperfect sewerage?

3. Describe the appearances of cysticerci and of the trichina in pork.

PATHOLOGY.

1. Describe the typical phenomena characteristic of obstruction of the intestines, and explain how fæcal vomiting occurs.

2. Mention the chief forms of intestinal obstruction (exclusive of hernia).

3. Give a summary of the prominent phenomena in a case of intus-susception.

EXAMINATION OF ASSISTANT SURGEONS PREVIOUS TO PROMOTION.—JANUARY 1869.

SURGERY AND SURGICAL ANATOMY.

1. Give a description of carbuncle; specifying,
(*a*) Its appearance and symptoms,
(*b*) The conditions which give rise to it,
(*c*) Its pathological nature,
(*d*) Its treatment.

2. What ophthalmic pathological conditions give rise to the symptoms usually designated *muscæ volitantes*?
State how these diseased conditions are severally to be distinguished from the physiological muscæ volitantes occasionally noticed in perfectly healthy eyes.

3. A bullet-wound of the tongue is followed by hæmorrhage. From what sources may the bleeding arise, and what steps may require to be taken in order to arrest it.

4. What structures are divided in cutting off the hand by a section through the radio-carpal articulation?

MEDICINE.

1. Give a definition of the disease known as epidemic cerebro-spinal meningitis. Describe the disease, and explain how the various systems (digestive

respiratory, circulatory, &c., &c.) are affected in its course, adding its diagnosis, and the general principles on which, in the present state of knowledge you would treat it?

2. Give a complete account of empyema, its causes, symptoms, progress, modes of termination, diagnosis, treatment.

3. What is carbolic acid? Give as complete an account as you can of the purposes to which it is applied in modern medicine.

Hygiene.

1. What are the chief reasons for believing that malarious fever, dysentery, and cholera may be sometimes caused by impure drinking-water? What are the best means of purifying water in cases when a fresh source cannot be obtained?

2. What is the official plan for ventilating barracks and hospitals in the United Kingdom, and what objects are sought to be obtained from this system?

3. In cases of a threatened outbreak of yellow fever, what precautions would you take?

Pathology.

1. Describe the morbid conditions of the kidney in cases of Bright's disease.

2. What do you understand by the conditions described by the terms "*Thrombosis*" and "*Embolism*"? Give an account of the different kinds of embolism and the ultimate results.

3. What are the skin diseases associated with fungi, and give an account of the forms of the fungi peculiar to each.

EXAMINATION OF ASSISTANT SURGEONS PREVIOUS TO PROMOTION.—MARCH 1869.

Surgery and Surgical Anatomy.

1. Describe the symptoms of the following forms of Iritis:—
   (*a*) Simple idiopathic iritis,
   (*b*) Serous iritis,
   (*c*) Suppurative iritis,
   (*d*) Syphilitic iritis,
   (*e*) Traumatic iritis,

and mention the treatment to be adopted in each kind.

2. How many kinds of whitlow are there? How are they distinguished? How are they to be treated?

3. In what cases of gun-shot injury of the hip-joint would you practice excision? In what cases would you consider amputation at the articulation absolutely necessary? Has primary or secondary amputation at the hip-joint been followed by the greater proportion of recoveries?

4. What structures do you divide if you take away the foot by a section through the ankle-joint?

Medicine.

1. Give the most complete account you can of the affection known as locomotor ataxy. A careful diagnosis is required between this disease and paraplegic affections.

2. Give the etiology, symptoms, diagnosis, prognosis, and treatment of delirium tremens. A distinct statement of your opinion on the use of opium and stimulants in the treatment of this affection is required.

3. Describe suppurative inflammation of the liver, its etiology, modes of termination, diagnosis, and treatment. A precise statement of your opinion, the result of experience, on operative interference is required, and your views on the modes of evacuating abscess of the liver without admitting air into the cavity.

Hygiene.

1. What is the present death-rate of the army serving at home; what diseases make up the chief items of the mortality, and what do you conceive to be the principal causes of these diseases?

2. What are the usual sanitary precautions adopted when cases of either typhoid fever, scarlet fever, or cholera occur in a barrack?

3. What is the usual length and rapidity of marches, and what weight is a man serving at home supposed to carry in full marching order? What are the usual sanitary precautions to be adopted at home or abroad during marches extending over several days?

Pathology.

1. Give a pathological account of the nature of the fevers described as Maltese or Mediterranean. State in what respects they differ from British continued fevers; and what are the best methods of measuring or otherwise investigating and comparing the amount of febrile disturbance.

2. What are the elements and forms of texture which compose a fungus? Name the diseases in which fungi are known to take a prominent place in the lesion.

3. Give an account of the specific lesions seen in cases of typhoid fever.

THE ALEXANDER MEMORIAL.

It was determined by the Executive Committee last year—

1. That out of the interest of the amount now invested, a medal to be called the Alexander Medal, and to be of not less value than 5*l.*, and a purse containing 50*l.*, be awarded, once in every three years, to the executive Medical Officer, on full pay, who shall write the best essay on a subject to be selected by the Executive Committee, and to be competed for under the following conditions:—

2. The selection of subjects to be confined to—

Military Medicine,
" Surgery,
" Hygiene.

3. The first subject selected for competition to be announced as soon as possible, and the essays to be completed and dispatched by the writers to "The President of the Alexander Memorial Fund Committee, 6, Whitehall Yard," on or before the 31st December, 1869.

4. Each essay to be clearly and legibly written, superscribed with a motto, and accompanied by a sealed envelope similarly superscribed, and containing the name of the writer.

5. The relative merits of the essays to be determined by assessors, to be selected by the Executive Committee.

6. The prize to be invariably awarded to the best essay offered, without reference to the number of competitors, provided the writer has complied with the prescribed conditions.

7. The subject for the first competition to be—

> "The etiology and prevalence of diseases of the heart among soldiers, as compared with the civil population of those countries in which they are called upon to serve, and the means of prevention or mitigation,—due regard being had to the conditions in which the soldier is unavoidably placed."

APPENDIX No. XX.

CIRCULARS, GENERAL ORDERS, &c.

HAVING REFERENCE TO THE MEDICAL DEPARTMENT FROM 1ST SEPTEMBER, 1868, TO 30TH APRIL, 1869.

1st. WAR OFFICE CIRCULARS.

Treatment of Pensioners in Military Hospitals.

Clause 106. 1st October, 1868.

Pensioners having recently been admitted into Military Hospitals for treatment and subsistence without the sanction of the Secretary of State for War, the following regulations are notified for the guidance of Officers Commanding and others:—

1. Pensioners when called out for training or in aid of civil power, are not entitled to treatment in Military Hospitals, unless they are taken ill on duty, in which case the ordinary hospital stoppage accounts will be rendered by the Purveyor to the Staff Officer of Pensioners, who will report to the War Office for Instructions as to what proportion of the stoppage is to be paid by the Pensioner, and what by the public; stating the nature of the disease or injury for which the Pensioner was under treatment, and the circumstances under which he became affected by it, in order that the proportion of expense to be borne as Contingent Charges in the Pay List of the Enrolled Pensioners may be decided.

2. Pensioners employed as clerks, or in any other capacity in the civil or other departments of the Army, and occupying quarters in barracks by War Office authority, when attacked by any contagious or infectious disease which renders their removal into hospital necessary on sanitary grounds, will be charged stopages at the rate of 1*s.* a-day in aid of the expense incurred for their subsistence while under treatment.

3. When Pensioners, not called out for training or in aid of the civil power, nor entitled to occupy public quarters, are sent into hospital without the sanction of the Secretary of State for War, the officers by whose orders they are admitted will be held liable to a charge of 2*s.* for each day the patient is dieted by the public.

4. Soldiers discharged, with or without pension, and unable through illness to proceed to their homes, may be temporarily treated and subsisted in hospital until they are able to be sent to their destination; but all such cases will be reported by the Officer Commanding to the War Office.

Disinfectants.

Clause 109.

It is hereby notified that whenever a disinfectant is necessary, under the provisions of Clause 92 of Army Circular of 1867, carbolic acid powder is to be used if practicable. It must be carefully applied, and in sufficient quantity to arrest decomposition.

The cheapest that can be obtained from a respectable vendor is to be used.

Fee for Medical Examination of Men on Re-engagement.

Clause 126. 1st December, 1868.

It is notified with reference to Clause 446 of the Royal Warrant of 3rd February, 1866, that a fee of 2*s.* 6*d.* only is admissible for the Civil or Militia Surgeon who may be selected to conduct the medical examination of men on re-engagement, whether such examination is followed by rejection or approval.

Hospital Treatment for Women and Children.

Clause 134.

1. With reference to W. O. Circular 849, Section X., and to Clause 50, Army Circulars 1867, §. 41, it is notified for the information and guidance of Officers Commanding and others, at stations where there are women's hospitals, that when others than the wives and children of soldiers on the married establishment of corps are sent into hospital for treatment on the recommendation of the Principal Medical Officer, and with the approval of the General Officer Commanding, a daily stoppage of 1*s.* in the case of each adult, and of 6*d.* in the case of each child under 10 years of age, will be charged against the husband or parent.

2. It is to be understood that such admissions are to be confined to cases of infectious and contagious diseases among persons, whom it is deemed necessary, on sanitary grounds, to remove from the public quarters occupied by them under W. O. authority. Women and children admitted with other diseases will be charged a double rate of stoppage, which must be paid by the Officer on whose certificate the admission took place.

3. Persons not entitled to public quarters are not to be admitted into hospital under any circumstances.

4. It is also notified that issues of medical comforts under Clause 50, Army Circulars 1867, §. 40, will be restricted to the cases of sick women and children of soldiers on the married establishment of corps, and can only be sanctioned where there is a hospital provision store. Medical comforts purchased under the authority of Commanding or Medical Officers cannot be sanctioned as a public charge; and the value of articles issued to the wives and children of soldiers not on the married establishment of corps, or of pensioners employed in the service, will be recovered from the officers on whose certificates the issues were made.

Travelling expenses of Officers relieving others proceeding on Leave.

Clause 3. 1st January, 1869.

Travelling expenses within the command of officers detached to relieve departmental officers proceeding on leave of absence will be borne by the public, as in the case of regimental officers.

Medical Comforts.

Clause 6.

Losses having occurred in consequence of champagne and other articles not usually prescribed for sick in hospital, being ordered in unnecessarily large quantities, it is notified for the information and guidance of Purveying Officers and others, that demands on contractors for supplies of such medical comforts are to be limited, as far as possible, to the daily requirements, as shown by the patient's diet sheets.

Any loss arising from neglect of this order will be chargeable to the Officer by whom the supplies have been demanded.

Supplies of Lime.

Clause 7.

The Secretary of State for War having had under his consideration the regulations for supplies of lime for whitewashing and for sanitary purposes, as laid down W. O. Circulars 385, 606, 659 (Foreign Stations), 949 (exclusive of India), and Circular Memorandum (to Barrackmasters abroad), 3rd January, 1868, has been pleased to cancel them, and, with the concurrence of His Royal Highness the Field-Marshal Commanding-in-Chief, has ordered the following Regulations to be substituted:—

1. The entire whitewashing, including scraping and stopping, of all barrack and War Department establishments, will be performed periodically by the Royal Engineer Department.

2. The general whitewashing at home stations will take place once in two years, but inasmuch as climate or local circumstances may render it desirable

that the period should vary at different foreign stations, the Secretary of State will leave it to General Officers Commanding at the several stations abroad to fix the period in each case.

3. When this period has once been fixed by a General Officer Commanding, it will not be changed by any subsequent General Officer Commanding without the prior sanction of the Secretary of State.

4. All intermediate whitewashing between these periods will be performed by the troops, under the superintendence of the Royal Engineer Department, by which department the necessary materials, brushes, and implements will be provided on the requisitions of Officers Commanding Corps or detachments, made upon the annexed Form 1421. The working pay for troops employed on this duty is laid down in the Royal Warrant for Pay, &c., Part I., Division II., Section 3.

5. Civilian labour will not be employed for this service without the previous sanction of the General Officer Commanding; and never when it can possibly be performed by the troops. See paragraph 992, Queen's Regulations.

6. No part of a barrack, with the exception of urinals and latrines, regarding which no limit is fixed, should be whitewashed more than twice a year.

7. Form 1421, properly filled up and certified, will be annexed to the accounts containing the charge for whitewashing, when transmitted to the War Office for audit.

8. Commanding Royal Engineers will provide annually in their estimates the funds necessary to meet the whole of the preceding expenditure.

9. Lime required for sanitary purposes, such as the purification of drains, ashpits, urinals and privies, will, on the requisition of Commanding Officers, made upon Form 1420 annexed, be provided by the contractor on the order of the Barrackmaster, or of an Officer of the Control Department where the control system is established.

10. Form 1420, properly filled in and certified, will be annexed to the accounts containing the charge for lime when transmitted to the War Office.

11. Officers signing Forms 1420 and 1421, will be held responsible for the necessity for the expenditure, and the accuracy of the statements on the forms in all respects.

Disinfectants at Isolated Stations.

Clause 38. 1st April, 1869.

Issues of disinfectants at isolated stations, when very emergent, may be made on the requisition of the Principal Medical Officer of the garrison or post, and sanctioned by the Officer in immediate command; the circumstances being reported through the General or other Officer Commanding, in accordance with Clause 92, Army Circulars 1867.

Distribution of Army Circulars.

Clause 39.

1. An additional copy of this, and every future month's Army Circular, will be sent to each regiment and depôt battalion, to enable the Commanding Officer to supply a copy to any one of the regimental staff whose duties may be referred to therein.

2. General Officers abroad will be guided by this rule in distributing Army Circulars to the troops under their command.

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2. GENERAL ORDERS.

Promotions.

No. 78. 1st September, 1868.

Her Majesty has been graciously pleased to command that the undermentioned Medical Officers be promoted to the ranks specified, in consideration of their valuable services with the force in question, viz.:—

Deputy Inspector-General of Hospitals Samuel Currie, M.D., C.B, to be Inspector-General of Hospitals.

Staff Surgeon-Major Thomas Guy, M.D., to be Deputy Inspector-General of Hospitals.

Surgeon Charles Dodgson Madden, 4th Foot; Surgeon Neil Henry Stuart, 3rd Dragoon Guards; and Surgeon James Sinclair, 33rd Foot, to be Surgeon-Majors.

Dated 15th August, 1868.

Hospital Establishments.

No. 81. 29th July, 1868.

The three hospital orderlies, per Infantry regiment, authorised by G. O. No. 59, are to be armed with drummers' swords; and on their receipt, Officers Commanding will return to the nearest store station the rifles belonging to these men. Suitable frogs for the waist-belts in their possession will also be supplied, and their other articles of accoutrements are to remain with the corps to meet any casualties that may arise.

Officers' Dress—Medical.

No. 11. 1st February, 1869.

Referring to G. O. 79 of 1868,—patterns of the dress pouch-belt and sword-belt for Medical Officers have now been sealed, and are deposited at the Horse Guards for general information and guidance.

These belts will be worn by officers below the rank of Deputy Inspector-General of Hospitals *only* on the occasions referred to in the G. O. above quoted.

The following is a description of the belts:—

For Medical Officers ranking with Brigadiers and Major-Generals,—

Four rows of gold embroidery ¼ inch wide on black morocco shoulder-belt, gilt chased buckle and slide (no breast ornament). Pouch of black morocco leather, flap 6½ inches wide, 3¼ inches deep, and pointed,—with three rows of ¼-inch gold embroidery,—gilt chased V. R. and crown ornament.

Sword-belt black morocco leather, with three rows of gold embroidery ¼ inch wide on the waist-belt, and three rows $\frac{5}{16}$ inch on the slings; gilt chased clasp, with silver lion and crown.

For officers ranking under Brigadiers,—

Three rows of gold embroidery on the pouch-belt, and two on the pouch and sword-belt, as above described.

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3. DEPARTMENTAL CIRCULARS.

Circular Memorandum—Sanitary.

21st April, 1868.

The attention of Medical Officers is called to the first paragraph of the Circular from the Army Medical Department, dated 21st September, 1858, directing that "every recruit, without exception (whether he bears marks of "natural smallpox, of successful vaccination, or otherwise), may be vaccinated "on joining the Head-Quarters or Depôt of the corps to which he belongs, "unless the operation is certified to have been already successfully performed "subsequently to his enlistment into the Service."

Circular Letter.

23rd December, 1868.

The Principal Medical Officer at is informed that the copy of the new Nomenclature of Diseases which has been issued to each Medical Officer is to be considered as a public document, to be retained by the officer to whom it has been supplied for use during his service in the Army.

Circular—Medical.

1st January, 1869.

1. It having been represented by several Principal Medical Officers and others, that there is undue expenditure of medicines, surgical materials, and dispensary sundries used in Army hospitals, Medical Officers in charge will be good enough to personally supervise the issues under these heads.

2. At the periodical inspections, Principal Medical Officers will minutely examine the Prescription Books, to see that all articles used in the hospital, or issued to patients out of hospital, have been duly and properly entered; that the persons so prescribed for are entitled by the Regulations to medical aid at the public expense; and that the totals of the ingredients in the prescriptions correspond with the quantities expended from the Surgery Stores. For this purpose detailed abstracts of the prescriptions written in the intervals of the inspections should be prepared by the Hospital Serjeant, and verified by the Medical Officer in charge.

3. Principal Medical Officers are required to see that where less expensive preparations are as efficacious, and as suitable as more expensive articles, the cheaper remedy is employed.

4. In forwarding returns of medicines, &c., the Medical Officer in charge will personally examine the same, verifying the quantities in the columns "Expended" and "Remaining", with the expenditure according to the Prescription Books, and the quantities actually remaining on hand; and the Principal Medical Officer will, at the next inspection, satisfy himself that this has been done.

5. Before approving a requisition for a further supply, the Principal Medical Officer will take steps to ascertain that there is no undue accumulation of any article in store, and that each item indented for will probably be required in the quantity demanded.

Circular—Statistical.

23rd March, 1869.

In the classification of diseases adopted in the Nomenclature drawn up by the Royal College of Physicians, there is no group corresponding with that which has occupied a place in the returns of the department for the last thirty years, under the names first of Venereal, and latterly of Enthetic Diseases; the syphilitic affections comprised in it being now included under General Diseases, subdivision B; and the Gonorrhœal, under Local Diseases, subdivision Urinary System.

These diseases, however, form a group of such importance in the Army, whether viewed as a cause of temporary inefficiency for duty, or with reference to their ultimate effects on the mortality and invaliding, that it appears advisable to have accurate special records kept of their prevalence. With this view every Principal Medical Officer is required to furnish, with his Annual Returns of Sick, a special Return on W. O. Form No. 825, showing the number of cases which have occurred among the troops in the district, colony, or Command under his superintendence; and every Medical Officer in charge of troops will furnish annually a similar Return, through the Principal Medical Officer, as one of the documents to accompany his Annual Return of Sick.

The Director-General trusts that Medical Officers will use their best exertions to make this Return as complete and accurate as possible, by correcting in it those errors of diagnosis which must sometimes occur on the first admission of the patient. This they will be enabled to do by a careful examination of the cases as recorded in the Enthetic Register.

The Director-General requests the attention of the Medical Officers to the instructions respecting the classification of these diseases, which are annexed to the W. O. Form, and which he believes will be found sufficiently explicit to insure uniformity in the Returns.

Circular.

May 1869.

With a view to remove all misapprehension regarding the medical treatment of soldiers while in the service, or about to be invalided, it is to be clearly understood by every Medical Officer in the Army, that no measures are to be resorted to in any case with any other view than the treatment of the malady. The measures adopted must be such only as would be had recourse to in similar cases by physicians and surgeons practising in civil life.

APPENDIX No. XXI.

ABSTRACT No. 1, showing the Admissions into Hospital, Deaths, and Invaliding among the Troops in the United Kingdom in 1867.

Diseases.	Household Cavalry.			Cavalry.			Military Train.			Royal Artillery.			Foot Guards.			Infantry Regiments.			Roy. Art. Depôt Brigade.			Depôt Battalions.		
Strength	1,226			7,710			1,321			7,811			5,529			20,644			3,011			15,649.		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
I. *Zymotic Diseases.*																								
1 Miasmatic:																								
Variola	2	..	..	1	..	..	1	..	..	7	1	..	1	..	..	2	..	..	4	..	..	13	..	..
Varioloides	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..
Varicella	2	..	..	4	..	..	..	..	..	..	..	..	2	..	..	2	..	..	2	..	..	3	..	..
Morbilli	..	..	..	7	..	..	..	..	..	8	1	..	4	..	..	21	..	..	1	..	..	22	..	..
Scarlatina	1	..	..	1	..	..	..	..	..	4	..	..	4	..	..	8	..	..	15	..	..	3	1	..
Tonsillitis	36	..	..	210	..	..	35	..	..	217	..	1	148	..	..	456	..	..	215	..	..	599	..	..
Influenza	1	..	..	74	..	..	43	..	..	40	..	..	119	..	..	240	..	..	93	..	..	172	..	..
Coryza	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..
Ophthalmia	3	..	..	52	..	2	10	..	..	83	..	1	34	..	1	381	..	17	25	..	..	241	..	8
Erysipelas	..	..	..	9	2	..	3	..	..	11	..	..	12	..	..	39	1	..	9	..	..	33	3	..
Furunculus	17	..	..	178	..	..	15	..	..	84	..	..	23	..	..	176	..	..	27	..	..	125	..	..
Anthrax	..	..	..	8	..	..	1	..	..	7	..	..	4	..	..	14	..	..	4	..	..	4	..	..
Pyæmia	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	1	..
Dysenteria Acuta	..	..	..	4	1	..	..	..	..	7	..	..	..	..	..	12	..	..	2	..	..	5	2	..
„ Chronica	..	..	..	1	..	..	..	..	..	18	..	2	..	..	..	8	..	2	6	..	..	26	3	2
Diarrhœa	25	..	..	74	..	..	11	..	..	113	2	2	81	..	..	234	1	2	50	..	..	176	..	..
Cholera	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Febris Intermittens	..	..	..	9	..	..	2	..	..	52	..	1	..	..	..	71	..	..	102	..	..	125	3	1
„ Remittens	..	..	..	4	..	..	1	..	..	2	..	..	..	..	..	8	..	..	3	..	..	1	..	..
„ Typhoides	1	1	..	6	..	..	..	..	..	6	2	..	3	2	..	4	..	..	1	1	..	2	2	..

Febris Typhus	..	..	..	..	..	3	1	..	..	..	..	..	..	..	..	..	..	23	16	..	1	1	..	2	..	..
„ Continua	..	..	..	7	..	..	60	3	..	14	..	..	105	1	..	89	2	..	293	4	..	87	..	..	200	4	1
Rheumatismus Acutus	..	..	25	..	1	124	..	1	40	..	..	183	..	1	97	..	..	396	..	..	153	..	..	312	..	1
„ Chronicus	..	..	10	..	1	159	..	12	35	..	1	138	..	13	52	..	1	456	1	35	32	..	..	257	..	24
Parotitis	..	..	..	1	..	..	4	..	..	..	..	..	4	..	..	17	..	..	18	..	..	13	..	..	18	..	..
Vaccinia	..	..	..	..	..	..	1	..	..	..	..	..	7	..	..	..	..	..	..	..	..	3	..	..	7	..	..
2. Enthetic:																													
Syphilis Primaria	..	..	55	..	..	547	..	..	143	..	..	676	..	..	890	..	..	1697	..	..	334	..	..	1102	..	..
„ Secundaria	..	..	15	..	..	174	..	6	44	..	1	221	1	10	153	..	2	565	..	21	68	..	..	412	1	28
Cachexia Syphiloidea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..
Iritis Syphilitica	..	..	7	..	..	15	..	..	3	..	..	18	..	..	9	..	..	23	..	..	6	..	..	35	..	..
Bubo	..	..	16	..	..	157	..	..	38	..	..	138	..	..	124	..	..	552	..	..	38	..	..	499	..	..
Gonorrhœa	..	..	57	..	..	626	..	..	181	..	..	863	..	..	406	..	..	2249	..	..	589	..	..	2319	..	..
Phymosis, &c.	..	..	..	..	..	13	..	..	..	..	..	14	..	..	9	..	..	31	..	..	5	..	..	68	..	..
Orchitis (Gonorrhœal)	..	..	5	..	..	33	..	..	8	..	..	40	..	..	78	..	..	130	..	..	20	..	..	107	..	..
Ophthalmia (Gonorrhœal)		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Strictura Urethræ	..	..	1	..	..	16	..	..	3	..	..	29	..	1	14	..	1	57	..	9	6	..	..	34	..	2
Verrucæ	..	..	1	..	..	22	..	..	10	..	..	19	..	..	18	..	..	24	..	..	17	..	..	71	..	..
Ulcus Penis	..	..	..	..	..	33	..	..	..	..	..	4	..	..	..	..	..	43	..	..	..	..	..	48	..	..
3. Dietic:																													
Scorbutus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	..	1	..	1
Purpura	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	4	..	..	1	..	..	2	..	..
Rachitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Ebriositas	..	..	..	2	..	..	40	..	..	12	..	..	124	..	..	39	..	..	189	2	..	30	1	..	94	..	..
4. Parasitic:																													
Porrigo	..	..	..	..	..	..	7	..	..	..	..	..	1	..	..	4	..	..	43	..	..	2	..	..	44	..	..
Scabies	..	..	..	8	..	..	152	..	..	26	..	..	161	..	..	133	..	..	868	..	..	147	..	..	768	..	..
Tænia Solium	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	15	..	..	1	..	..	8	..	..
Vermes	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	1	..	..	4	..	..
Dracunculus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..
Ascaris Lumbricoides	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..

Abstract No. 1—*continued.*

Diseases.	Household Cavalry.			Cavalry.			Military Train.			Royal Artillery.			Foot Guards.			Infantry Regiments.			Roy. Art. Depôt Brigade.			Depôt Battalions.		
Strength	1,226			7,710			1,321			7,811			5,529			20,644			3,011			15,649		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Ascaris Vermicularis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Phthiriasis	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	..	..	1	..	..
II. *Constitutional Diseases.*																								
1. Diathetic:																								
Podagra	..	..	..	3	..	..	1	..	..	..	..	..	4	..	..	1	..	..	1	..	..	1	..	..
Lumbago	9	..	..	32	..	..	3	..	..	12	..	..	12	..	..	27	..	..	3	..	..	31	..	..
Ischias	..	..	..	4	..	..	1	..	..	..	..	..	2	..	..	6	..	..	..	..	..	2	..	..
Anæmia	..	..	..	..	..	..	..	..	..	4	..	..	13	..	..	7	..	1	..	..	..	26	..	..
Anasarca	1	..	..	5	1	..	1	..	..	3	..	1	..	..	..	4	..	..	1	..	..	8	2	1
Tumores	1	..	..	5	..	..	..	..	..	2	..	..	8	..	..	11	..	1	3	..	..	6	..	..
Gangræna	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Carcinoma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..
2. Tubercular:																								
Scrofula	..	..	1	9	..	1	..	..	1	14	1	2	7	1	3	45	..	11	4	..	..	35	2	4
Phthisis Pulmonalis	10	5	4	35	9	29	5	1	3	80	12	41	53	13	39	155	57	76	23	11	10	138	66	108
Hæmoptysis	7	..	..	10	1	5	2	..	..	30	1	1	16	1	2	33	1	2	6	2	1	33	3	4
Abscessus Psoanus	..	..	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Morbus Coxarius	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	..	2
Tuberculosis Mesenterica ..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	..	2	..	1

III. *Local Diseases.*

1. Nervous System:

| | | |

Abstract No. 1—*continued.*

Diseases.	Household Cavalry.			Cavalry.			Military Train.			Royal Artillery.			Foot Guards.			Infantry Regiments.			Roy. Art. Depôt Brigade.			Depôt Battalions.		
Strength	1,226			7,710			1,321			7,811			5,529			20,644			3,011			15,649		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
2. Circulatory System:																								
Carditis	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	9	..	6	1	..	..	3	..	2
Pericarditis	..	..	..	3	1	..	1	1	..	3	..	..	..	..	..	14	3	3	2	2	..	6	2	..
Angina Pectoris	..	..	..	1	..	..	..	..	..	1	..	..	1	..	..	7	..	..	1	..	..	2	..	..
Hypertrophia Cordis	..	..	..	9	..	7	..	..	..	13	..	5	2	..	1	50	1	12	..	..	..	15	..	8
Morbus Valv: Cordis	..	..	..	10	1	10	2	..	1	17	2	11	17	5	10	45	4	25	5	..	3	82	6	47
Degeneratio Cordis	..	..	1	1	..	2	..	..	..	..	2	..	..	1	..	1	1	2	1	2	..	1	3	..
Atrophia "	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..
Morbus Cordis	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	2	..	..	..	..	..	..	..	..
Aneurisma Aortæ	..	..	..	2	5	..	..	..	..	2	3	1	2	1	..	2	9	..	..	..	..	3	5	..
Aneurisma	..	..	..	5	..	1	..	1	..	2	2	..	2	1	1	11	8	2	..	..	..	5	3	..
Atheroma Aortæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Varix	..	..	..	9	..	14	..	..	..	7	..	6	7	..	2	21	..	23	1	..	..	13	1	12
Phlebitis	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Syncope	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Palpitatio	..	..	..	..	..	..	2	..	..	2	..	..	4	..	2	22	..	1	..	..	..	4	..	..
3. Respiratory System:																								
Laryngitis	..	..	2	..	1	3	..	2	..	..	..	4	..	..	..	1	..	1	2	..	..	4	..	1
Bronchitis Acuta	..	..	68	..	..	369	1	..	64	..	..	487	..	1	225	1	7	902	1	1	151	..	..	629	2	..
" Chronica	..	..	3	..	..	71	..	10	16	..	1	91	..	6	44	..	2	315	..	41	36	1	..	252	5	23
Pleuritis	..	..	3	..	..	11	..	..	2	..	..	24	2	1	15	..	3	94	2	3	7	..	1	54	1	1
Hydrothorax	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Empyema	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	2	1	1	..	..	..	..	..	..

Pneumonia	..	..	..	6	..	..	38	5	..	4	..	..	26	4	..	24	1	2	96	14	1	16	1	..	70	17	2
Apoplexia Pulmonalis	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Asthma	..	..	..	..	..	..	3	..	..	2	..	..	2	..	..	1	..	..	16	1	2	..	..	..	8	..	2
Emphysema	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	1
Epistaxis	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	..	1	..	..
Pleurodynia	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	2	..	..	5	..	..	..	..	..	4	..	..
4. Digestive System:																											
Stomatitis	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	9	..	..	..	..	..	3	..	..
Glossitis	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Œsophagitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..
Pharyngitis	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gastritis	..	..	..	..	..	..	4	1	..	..	..	..	1	..	..	..	..	..	9	..	..	..	..	..	4	..	..
Enteritis	..	..	..	..	1	..	..	..	..	..	..	..	3	..	..	1	1	..	2	1	..	..	..	..	4	1	..
Peritonitis	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	4	..	..
Obstipatio	..	..	..	..	..	..	6	..	..	2	..	..	8	..	..	2	..	..	18	..	..	..	..	..	9	..	..
Dyspepsia	..	..	..	..	36	..	..	81	..	..	20	..	..	115	..	..	79	..	..	309	..	4	30	..	..	174	..	3
Colica	..	..	..	..	3	..	..	15	..	..	2	..	..	27	..	..	34	..	..	56	..	..	11	..	..	20	..	..
Hæmatemesis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	1	..	..	1	..	..	1	..	5
Hernia	..	..	..	..	2	..	1	3	..	18	5	1	1	23	..	19	6	..	3	29	..	22	5	..	3	27	..	..
Intus-susceptio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Ileus	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hæmorrhois	..	..	..	3	..	..	40	..	..	8	..	..	28	..	1	10	..	..	99	..	1	23	..	..	61	..	..
Fistula in Ano	..	..	..	..	..	..	5	..	1	2	..	..	7	..	1	4	..	1	7	..	2	1	..	..	11	..	2
Prolapsus Ani	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..
Splenitis	..	..	..	..	..	..	1	..	..	..	..	..	7	..	1	..	..	1	10	..	..	..	..	..	12	1	..
Hepatitis Acuta	..	..	..	..	..	..	4	..	..	1	..	..	9	..	2	2	..	..	33	1	..	3	..	..	10	..	..
„ Chronica	..	..	..	..	..	..	24	..	6	..	..	..	35	2	8	1	..	1	62	8	4	20	..	1	67	2	18
Icterus	..	..	..	..	2	..	..	20	..	..	4	..	..	24	1	..	39	..	..	52	..	..	12	..	..	57	..	..
Chololithus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..
Ascites	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	4	..	..	..	..	..	4	4	..
Melæna	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	3	..	..
5. Urinary System:																											
Nephritis	..	..	..	..	1	1	..	1	..	1	..	..	..	5	..	..	..	..	..	9	..	..	2	..	..	1	1	..
Nephria	..	..	..	..	..	..	1	8	2	1	3	1	..	3	1	..	2	..	1	4	..	1	..	..	..	9	1	5

Abstract No. 1—*continued.*

Diseases.	Household Cavalry.			Cavalry.			Military Train.			Royal Artillery.			Foot Guards.			Infantry Regiments.			Roy. Art. Depôt Brigade.			Depôt Battalions.		
Strength	1,226			7,710			1,321			7,811			5,529			20,644			3,011			15,649		
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Ischuria	..	..	..	1	..	..	2	1	..	..	..	..	1	..	..	1	..	..	1	..	..	3	..	..
Dysuria	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	2	..	..	1	..	..
Hæmaturia	..	..	..	2	..	..	..	..	..	6	..	..	2	..	..	5	..	..	..	..	..	6	..	..
Lithiasis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cystitis	1	..	..	1	..	..	..	..	..	..	..	..	2	..	1	5	..	..	..	..	..	2	..	..
Calculus Vesicæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..
Fistula in Perinco	..	..	..	1	..	1	..	..	..	1	..	..	..	..	..	1	..	1	..	..	..	3	..	1
Enuresis	..	..	..	5	..	1	5	..	1	15	..	..	2	..	..	15	..	2	7	..	..	24	..	1
Prostatitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Diabetes	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
6. Reproductive System:																								
Varicocele	..	..	..	3	..	3	..	..	..	1	..	1	6	..	..	3	..	1	..	..	..	2	..	..
Hydrocele	2	..	..	6	..	..	2	..	..	7	..	..	..	..	..	14	..	..	3	..	..	12	..	1
Orchitis (not Gonorrhœal) ..	7	..	..	78	..	..	17	..	..	101	..	4	36	..	..	183	..	1	22	..	..	126	..	5
Hydro-sarcocele	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sarcocele	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	5	..	..
7. Locomotive System:																								
Arthritis	..	..	..	4	..	..	..	..	..	6	..	1	6	..	..	18	..	1	..	..	..	8	..	3
Synovitis	..	..	..	16	..	..	..	..	..	14	..	1	6	..	..	33	..	1	4	..	..	24	..	3
Contractura	..	..	..	4	..	2	..	..	..	2	..	2	1	..	..	14	..	7	..	..	..	4	..	4
Hydrarthrus	..	..	..	1	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	3	..	..

Periostitis	..	..	..	..	..	..	..	10	..	2	4	..	1	15	..	1	6	..	..	34	..	6	2	..	..	17	..	2
Exostosis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Caries	..	..	..	..	..	..	..	..	..	2	..	..	..	1	1	..	..	..	..	2	..	2	2	..	..	3	..	..
Necrosis	..	..	..	..	..	..	..	7	..	1	..	..	1	..	..	..	1	..	1	2	..	1	1	..	1	6	..	5
Curvatura Spinæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	1	..	..	..	..	..	..
Atrophia Musculorum	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	1	..	..	1	1	..	..	..	..	..
Malformatio Pedum	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8. Integumentary System:																															
Urticaria	..	..	..	..	..	..	..	3	..	..	2	..	..	3	..	..	3	..	..	15	..	..	2	..	..	5	..	..
Eczema	..	..	..	..	10	..	..	33	..	..	9	..	..	22	..	2	24	..	..	134	..	..	30	..	..	153	..	..
Herpes	..	..	..	..	2	..	..	9	..	..	4	..	..	25	..	..	8	..	..	59	..	..	9	..	..	46	..	..
Impetigo	..	..	..	..	..	..	..	3	..	..	..	..	..	4	..	..	2	..	..	20	..	..	1	..	..	30	..	..
Psoriasis	..	..	..	..	6	..	..	7	..	..	1	..	..	17	..	..	4	..	..	42	..	..	4	..	..	24	..	..
Lichen	..	..	..	..	..	..	..	2	..	..	3	..	..	5	..	..	..	..	..	6	..	..	2	..	..	2	..	1
Ecthyma	..	..	..	..	..	..	..	5	..	..	..	..	..	1	..	..	..	..	..	13	..	..	..	..	..	3	..	..
Pityriasis	..	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	1	..	..	5	..	..	1	..	..
Acne	..	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	1	..	..	7	..	..	..	..	..	6	..	..
Lepra	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	5	..	..	3	..	..	3	..	..
Hordeolum	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Rupia	..	..	..	..	..	..	..	3	..	..	..	..	..	2	..	..	..	..	..	6	..	..	..	..	..	6	..	..
Roseola	..	..	..	..	..	..	..	1	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	2	..	..
Mentagra	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	2	..	..
Prurigo	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	..	..
Pernio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	3	..	..
Tinea Capitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Favus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Phlegmon	..	..	..	..	57	..	..	239	..	..	49	..	..	254	..	..	134	..	1	634	..	..	77	..	..	610	..	1
Abscessus	..	..	..	..	17	..	..	161	1	1	28	..	..	128	..	3	148	..	2	282	..	1	135	..	..	158	..	1
Paronychia	..	..	..	..	4	..	..	39	..	..	7	..	..	32	..	..	5	..	..	108	..	..	25	..	..	65	..	..
Ulcus	..	..	..	..	13	..	..	398	..	4	60	..	1	225	..	5	127	..	..	618	..	8	153	..	1	777	..	4
IV. *Developmental Diseases.*																															
4. Diseases of Nutrition:																															
Atrophia	..	..	..	..	..	..	..	5	..	3	1	..	..	7	..	1	9	..	..	53	1	10	1	..	..	47	..	18

Abstract No. 1—*continued.*

Diseases.	Household Cavalry			Cavalry.			Military Train.			Royal Artillery.			Foot Guards.			Infantry Regiments.			Roy. Art. Depôt Brigade.			Depôt Battalions.		
Strength	1 226			7,710			1,321			7,811			5,529			20,644			3,011			15,619		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
V. *Violent Deaths or Diseases.*																								
1. Accidental:																								
Ambustio	3	..	..	11	..	..	4	..	..	11	..	..	8	..	..	54	..	1	5	..	..	43	..	..
Explosio	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gelatio	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	1
Insolatio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..
Submersio	..	..	..	..	2	..	..	..	..	..	..	..	..	2	..	1	4	..	..	..	..	1	4	..
Asphyxia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Fractura	2	..	1	42	1	11	6	..	..	46	2	6	11	..	1	65	3	13	8	..	..	57	3	9
Amputatio	..	..	..	2	..	..	..	..	..	8	1	3	..	..	..	2	..	1	1	..	2	4	..	1
Necusia	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ruptura Vesicæ	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Compressio Cerebri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Resectio	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Contusio	49	1	..	463	..	2	85	..	..	446	..	1	80	..	..	611	..	1	134	..	..	465	3	..
Commotio	..	..	..	7	..	..	2	1	..	1	..	1	1	..	..	1	..	..	3	..	..	3	..	..
Vulnus Sclopetarium	..	..	..	3	..	..	..	..	..	1	1	..	..	..	..	2	1	1	..	..	..	3	..	1
„ Incisum	29	..	..	124	..	1	26	..	..	91	..	..	117	..	..	246	..	1	45	..	..	176	..	..
Luxatura	..	..	..	14	..	1	2	..	..	12	..	3	..	..	..	12	..	3	2	1	..	9	..	1
Subluxatio	26	..	..	130	..	..	22	..	..	169	..	1	83	..	1	386	..	2	62	..	..	238	..	2
Vesicula Pedis	..	..	..	13	..	..	1	..	..	28	..	..	11	..	..	77	..	..	13	..	..	61	..	..
Venenatio	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1

Morsus Tigridis	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Ursi	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Equi	..	..	..	..	..	6	..	..	2	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Canis	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..
„ Hominis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
„ Melis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
„ Simiæ	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3. Homicidal:																													
Vulnus Sclopetarium	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Concussio Cerebri	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	
4. Suicidal:																													
Venenatio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..		
Vulnus Incisum	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	2	..	1	..	1	..	..	2	..	..		
„ Sclopetarium	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	..	4	..	..	..	..	1	3	..		
ubmersio	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..		
Suspendium	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..		
6. Punitus:	..	..	..	..	..	2	..	..	2	..	..	2	..	..	1	..	..	15	..	..	..	..	..	..	4	..	..		
No appreciable disease	..	..	..	..	..	..	..	..	..	..	..	1	..	..	4	..	..	6	..	..	..	..	..	..	2	..	..		
Not known	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..		
Total	..	..	698	10	17	5702	49	195	1193	7	17	6432	50	200	4126	38	117	16,149	179	496	3324	28	36	13,442	180	474			

APPENDIX No. XXI—*continued.*

ABSTRACT No. 2, showing the Number of Men belonging to the Regiments serving at Home who were Vaccinated during the Year 1867.

	Results.	In those who bore Marks of previous Small-pox.	In those who bore good Marks of previous Vaccination.	In those who bore doubtful Marks of previous Vaccination.	In those who bore no Marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits.	A perfect vaccine pustule	50	346	149	80	625
	A modified ditto	68	309	193	60	630
	A failure in	90	376	156	62	684
	Total	208	1,031	498	202	1,939
Recruits.	A perfect vaccine pustule	194	3,484	184	353	4,215
	A modified ditto	358	4,793	233	240	5,624
	A failure in	406	5,385	156	208	6,155
	Total	958	13,662	573	801	15,994

APPENDIX No. XXI—*continued.*

ABSTRACT No. 3, showing the Ages of the Men serving in the different Arms at Home, and the Deaths at each Age in 1867.

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Household Cavalry	74	..	503	2	199	1	200	3	123	3	127	1	1,226	10
Cavalry of the Line	995	3	2,438	8	2,671	19	969	14	451	4	186	1	7,710	49
Royal Artillery	616	1	2,009	5	2,789	13	1,629	26	660	5	108	..	7,811	50
Military Train	169	..	395	..	410	3	241	3	93	..	13	1	1,321	7
Foot Guards	904	3	1,874	8	1,473	9	879	7	333	9	66	2	5,529	38
Infantry Regiments	3,494	12	5,036	39	6,664	52	3,500	46	1,675	23	275	7	20,644	179
Total	6,252	19	12,255	62	14,206	97	7,418	99	3,335	44	775	12	44,241	333
Depôt Brigade, R.A.	998	6	934	9	538	3	347	6	140	3	54	1	3,011	28
Depôt Battalions	4,271	21	3,891	38	3,260	38	2,053	36	1,687	37	487	10	15,649	180
Coast Brigade, R.A.	8	..	61	..	240	1	569	8	723	12	142	5	1,743	26
Total	5,277	27	4,886	47	4,038	42	2,969	50	2,550	52	683	16	20,403	234

APPENDIX No. XXI—*continued.*

ABSTRACT No. 4, showing the Number of Recruits Inspected, and the Number found unfit for Service in each of the Recruiting Districts during the Year 1867.

Districts.		Primary Inspections.	Secondary Inspections.		Total.
			Had been previously examined by Staff Surgeon or other Army Medical Officer.	Had been previously examined by Private Medical Practitioner.	
London ..	Inspected	4,592	368	2,387	7,347
	Rejected	1,639	27	279	1,945
Liverpool..	Inspected	2,660	450	599	3,709
	Rejected	990	47	134	1,171
Bristol ..	Inspected	386	57	708	1,151
	Rejected	136	7	108	251
York ..	Inspected	624	194	352	1,170
	Rejected	281	26	81	388
Glasgow ..	Inspected	1,362	235	232	1,829
	Rejected	621	29	49	699
Dublin ..	Inspected	1,157	173	150	1,480
	Rejected	428	11	17	456
Belfast ..	Inspected	718	77	187	982
	Rejected	340	4	36	380
Total	Inspected ..	11,499	1,554	4,615	17,668
	Rejected ..	4,435	151	704	5,290

APPENDIX No. XXI—*continued.*

ABSTRACT No. 5, showing the Native Country of the Recruits inspected at the Head Quarters of each of the Districts in 1867.

Districts.	England.		Wales.		Scotland.		Ireland.		British Colonies or Foreign Countries.	
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.
London ..	4,236	1,513	26	8	91	24	230	92	9	2
Liverpool ..	1,638	608	61	24	130	37	819	315	12	6
Bristol ..	348	124	4	..	1	..	33	12	..	..
York ..	481	204	3	2	20	7	120	68	..	..
Glasgow ..	53	28	..	..	972	437	337	156	..	..
Dublin ..	67	18	..	..	11	2	1,067	405	12	3
Belfast ..	21	8	2	2	51	31	641	298	3	1
Total ..	6,844	2,503	96	36	1,276	538	3,247	1,346	36	12

APPENDIX No. XXI—*continued.*

ABSTRACT No. 6, showing the Ages of Recruits inspected in 1867.

	Boys under 17.	From 17 to 18.	From 18 to 19.	From 19 to 20.	From 20 to 21.	From 21 to 22.	From 22 to 23.	From 23 to 24.	From 24 to 25.	25 and Upwards.
At Head Quarters of Recruiting Districts*	100	764	3,316	1,839	1,523	1,200	876	749	765	367
At Regiments and Depôts* ...	336	929	1,338	715	558	440	329	280	236	114
By Civil Medical Practitioners†...	31	740	2,705	1,491	1,157	843	796	601	650	94
Total	467	2,433	7,359	4,045	3,238	2,483	2,001	1,630	1,651	575

* Those Corps are omitted in which secondary inspections were included.
† Age of one man not known.

APPENDIX No. XXI—*continued.*

ABSTRACT No. 7, showing the Heights of the Recruits Inspected in 1867.

	Under 5 ft. 3 in	From 5 ft. 3 in. to 5 ft. 4 in.	From 5 ft. 4 in. to 5 ft. 5 in.	From 5 ft. 5 in. to 5 ft. 6 in.	From 5 ft. 6 in. to 5 ft. 7 in.	From 5 ft. 7 in. to 5 ft. 8 in.	From 5 ft. 8 in. to 5 ft. 9 in.	From 5 ft. 9 in. to 5 ft. 10 in.	From 5 ft. 10 in. to 5 ft. 11 in.	From 5 ft. 11 in. to 6 ft.	6 ft. and Upwards.
At Head Quarters of Recruiting Districts ...	115	109	484	3,783	2,996	1,883	1,058	612	317	99	43
At Regiments & Depôts. *	260	197	699	1,075	1,019	921	489	267	112	106	130
By Civil Medical Practitioners†	27	4	76	2,506	2,623	1,800	1,096	548	282	96	49
Total	402	310	1,259	7,364	6,638	4,604	2,643	1,427	711	301	222

* Those corps are omitted in which Secondary Inspections were included.
† Heights of two men not known.

APPENDIX No. XXI—*continued.*

ABSTRACT No. 8, showing the Number of Recruits inspected in 1867, at the Head-Quarters of Recruiting Districts, at the following Weights and Ages.

Ages and Country.	Under 100 lbs.	From 100 lbs. to 110 lbs.	From 110 lbs. to 120 lbs.	From 120 lbs. to 130 lbs.	From 130 lbs. to 140 lbs.	From 140 lbs. to 150 lbs.	From 150 lbs. to 160 lbs.	From 160 lbs. to 170 lbs.	From 170 lbs. and upwards.	Total.
Boys under 17	79	19	2	...	...	...	...	...	...	100
From 17 to 18	13	120	309	214	76	25	5	2	...	764
„ 18 to 19	138	225	901	1,250	554	188	54	5	1	3,316
„ 19 to 20	...	107	358	683	427	202	53	7	2	1,839
„ 20 to 21	...	5	203	439	454	265	133	22	2	1,523
„ 21 to 22	...	3	134	283	406	241	114	12	7	1,200
„ 22 to 23	...	7	60	202	252	215	116	15	9	876
23 to 24	...	6	39	167	251	185	97	12	2	749
„ 24 to 25	...	5	55	158	196	215	109	17	10	765
Upwards of 25	...	1	21	75	106	97	44	15	8	367
Total	230	498	2,082	3,471	2,722	1,633	715	107	41	11,499

APPENDIX No. XXI—*continued.*

ABSTRACT No. 9, showing the State of Education of the Recruits examined at the Head Quarters of the Recruiting Districts and at Regiments and Depôts in 1867.

	Well Educated.	Able to Write.	Able to Read only.	Unable to Read.	Total.
Recruiting Districts ..	476	6,989	1,001	3,033	11,499
Regiments and Depôts	587	3,714	884	853	6,038
Total	1,063	10,703	1,885	3,886	17,537

APPENDIX No. XXI—*continued.*

ABSTRACT No. 10, showing the Admissions into Hospital and Deaths among the Troops serving in the Mediterranean in the year 1867.

Stations ..	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength ..	4,555		4,919		595	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic Diseases:						
Variola ..	1	..	..	..	..	..
Morbilli ..	..	..	3	..	..	..
Scarlatina	2	..	1	..	..	..
Tonsillitis	95	..	68	..	10	..
Influenza	10	..	7	..	..	..
Ophthalmia	129	..	278	..	57	..
Erysipelas	10	..	4	..	..	..
Furunculus	19	..	59	..	..	..
Anthrax ..	2	..	5	..	..	..
Dysenteria Acuta	24	2	13	..	..	..
„ Chronica	1	..	7	1	..	..
Diarrhœa	118	..	319	6	23	..
Cholera Spasmodica	..	..	27	22	..	..
Febris Intermittens	12	..	3	..	..	..
„ Typhoides	17	2	4	3	..	..
„ Continua..	307	2	1121	36	18	1
Rheumatismus Acutus ..	37	..	88	..	31	..
„ Chronicus	59	..	156	..	3	..
Parotitis ..	3	..	1	..	..	..
2. Enthetic Diseases:						
Syphilis Primaria	424	..	63	..	10	..
„ Secundaria	51	..	55	..	2	..
Iritis Syphilitica	1	..	..	..	..	..
Bubo ..	126	..	14	..	1	..
Gonorrhœa	324	..	116	..	18	..
Phymosis, &c. ..	2	..	1	..	..	..
Orchitis (Gonorrhœal) ..	28	..	4	..	4	..
Strictura Urethræ	9	..	12	..	..	..
Verrucæ	10	..	3	..	..	..
3. Dietic Diseases:						
Purpura ..	1	1	2	1	..	..
Ebriositas	56	..	107	2	..	..
4. Parasitic Diseases:						
Porrigo ..	5	..	..	..	..	..
Scabies ..	22	..	10	..	..	..
Tænia Solium ..	2	..	13	..	..	..
Ascaris Lumbricoides ..	1	..	..	..	..	..
Phthiriasis ..	..	..	1	..	..	..

Abstract No. 10—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,555		4,919		595	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*						
1. Diathetic Diseases:						
Podagra	1	..	..	..	..	..
Ischias	..	..	5	..	..	..
Lumbago	10	..	2	..	..	..
Anæmia	5	..	13	..	..	..
Anasarca	..	..	2	..	1	..
Tumores	3	..	3	..	..	..
Carcinoma	1	1	2	..	..	..
Scirrhoma	..	..	1	1	..	..
2. Tubercular Diseases:						
Scrofula	10	..	4	..	..	..
Phthisis Pulmonalis	43	4	29	5	3	..
Hæmoptysis	10	..	11	..	1	..
III. *Local Diseases.*						
1. Of the Nervous System:						
Meningitis	1	1	..	..	..	..
Apoplexia	..	..	2	2	..	1
Paralysis	8	1	1	..	..	..
Delirium Tremens	5	1	16	..	1	..
Mania	3	..	1	..	1	..
Amentia	5	..	7	..	2	..
Epilepsia	12	..	9	..	..	..
Convulsio	1	..	..	..	2	..
Cephalæa	14	..	22	..	..	..
Neuralgia	3	..	3	..	..	..
Dysecœa	3	..	..	..	..	..
Otitis	11	..	5	..	1	..
Cataractes	2	..	..	..	..	..
Cæcitas	..	..	1	..	..	..
Myopia	..	..	2	..	..	..
Fistula Lachrymalis	..	..	2	..	..	..
2. Of the Circulatory System:						
Carditis	..	..	1	1	..	..
Hypertrophia Cordis	4	..	17	2	..	..
Morbus Valv: Cordis	21	1	23	3	..	..
Angina Pectoris	1	..	3	..	..	..
Aneurisma Aortæ	3	1	3	3	..	..
Aneurisma	..	1	..	..	..	..
Varix	4	..	9	..	..	..
Syncope	..	..	2	..	..	..
Palpitatio	..	..	17	..	..	..

Abstract No. 10—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,555		4,919		595	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
3. Of the Respiratory System:						
Bronchitis Acuta	66	..	92	1	28	..
„ Chronica	64	1	52	2	4	..
Pleuritis	5	..	..	..	..	..
Pleurodynia	..	..	8	..	..	..
Pneumonia	17	4	16	1	..	..
Asthma	1	..	7	..	3	..
Emphysema	1	..	..	..	..	..
Epistaxis	1	..	..	..	..	..
4. Of the Digestive System:						
Pharyngitis	1	..	..	..	..	..
Gastritis	2	..	1	1	1	..
Enteritis	..	..	..	..	1	..
Obstipatio	3	..	10	..	..	..
Dyspepsia	108	..	58	..	44	..
Colica	10	..	10	..	..	..
Hæmatemesis	..	..	1	..	..	..
Hernia	1	..	14	..	..	..
Hæmorrhois	15	..	15	..	3	..
Prolapsus ani	1	..	1	..	..	..
Fistula in ano	3	..	2	..	..	..
Splenitis	2	..	1	..	..	..
Hepatitis Acuta	5	..	7	1	1	1
„ Chronica	7	1	39	2	..	..
Icterus	16	..	56	1	..	..
Cirrhosis	..	..	1	1	..	..
Ascites	..	..	1	1	..	..
5. Of the Urinary System:						
Nephritis	1	..	1	1	..	..
Nephria	3	1	2	..	..	..
Hæmaturia	2	..	1	..	..	..
Lithiasis	1	..	..	..	..	..
Cystitis	..	..	1	..	1	..
Fistula in Perineo	..	..	..	..	1	..
Enuresis	3	..	5	..	..	..
Diuresis	..	..	1	..	..	..
Dysuria	1	..	..	..	..	..
6. Of the Reproductive System:						
Varicocele	1	..	..	..	..	..
Hydrocele	5	..	..	..	..	..
Orchitis (not Gonorrhœal) .. .	46	..	80	..	1	..
Sarcocele	3	..	1	..	..	..

Abstract No. 10—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,555		4,919		595	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
7. Of the Locomotive System:						
Arthritis	3	..	4	..	..	..
Synovitis	3	..	8	..	..	..
Hydrarthrus	..	..	2	..	..	..
Contractura	..	..	3	..	..	..
Periostitis	2	..	4	..	..	..
Caries	3	..	..	..	..	..
Necrosis	..	..	1	..	..	..
8. Of the Integumentary System:						
Urticaria	2	..	1	..	..	..
Eczema	17	..	12	..	..	..
Herpes	2	..	5	..	4	..
Impetigo	2	..	..	..	..	..
Psoriasis	5	..	12	..	..	..
Lichen	1	..	1	..	..	..
Acne	1	..	5	..	..	..
Lepra	..	..	3	..	..	..
Rupia	..	..	1	..	..	..
Ecthyma	..	..	1	..	..	..
Mentagra	..	..	1	..	..	..
Phlegmon	67	..	241	..	..	..
Abscessus	84	..	77	..	39	..
Paronychia	20	..	37	..	..	..
Ulcus	208	..	164	..	23	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	17	..	36	1	..	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	3	..	8	..	..	..
Explosio	3	..	..	..	..	..
Insolatio	1	..	..	..	..	..
Submersio	..	2	2	3	..	..
Fractura	13	1	17	6	1	..
Amputatio	..	..	1	1	..	..
Compressio Cerebri	..	..	1	1	..	..
Contusio	150	..	149	..	8	..
Commotio	..	..	8	..	1	..
Vulnus Sclopetarium	1	..	..	..	..	..
„ Incisum	65	..	77	..	20	..
Luxatura	5	..	3	..	1	..
Subluxatio	51	..	89	..	..	..
Vesiculæ Pedis	14	..	8	..	..	..

Abstract No. 10—*continued.*

Stations	Gibraltar.		Malta.		Native Troops. R. Malta Fencibles.	
Strength	4,555		4,919		595	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Suicidal:						
Vulnus Sclopetarium	2	1	..	5	..	..
„ Incisum	..	..	1	..	..	..
6. Punitus	1	..	..	..	..	..
No appreciable disease	1	..	2	..	..	..
Total	3,234	29	4,247	117	374	3

Causes of the Deaths among the Invalids.

	From Gibraltar.	From Malta.
Phthisis Pulmonalis	4	1
Mania	..	1
Pericarditis	1	..
Caries	1	..
Total	6	2

Appendix No. XXI—*continued.*

Abstract No. 11, showing the Diseases of the Men sent home as Invalids from the Mediterranean during the Year 1867, and of those finally discharged the Service.

Stations	Gibraltar.		Malta.	
Average Strength				
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
I. *Zymotic Diseases.*				
1. Miasmatic:				
Ophthalmia	4	7	2	1
Dysenteria Chronica	..	..	1	
Febris Continua	..	..	5	
Rheumatismus Chronicus	3	1	2	4
2. Enthetic:				
Syphilis Secundaria	1	2	2	3
Stricture Urethræ	..	..	1	..
3. Dietic:				
Purpura	..	..	1	..
Rachitis	—	—	1	—
II. *Constitutional Diseases.*				
1. Diathetic:				
Anæmia	2	..	2	..
Tumores	..	1	1	1
2. Tubercular:				
Scrofula	2	1	1	..
Phthisis Pulmonalis	28	26	16	20
Hæmoptysis	2	..	2	..
Morbus Coxarius	..	..	..	1
III. *Local Diseases.*				
1. Nervous System:				
Paralysis	2	..	2	..
Mania	3	..	1	..
Amentia	3	..	5	..
Epilepsia	1	1	3	2
Cephalæa	2	..	2	1
Dysecœa	1	1	3	1
Cataractes	1	..	..	..
Myopia	..	..	1	..
Cæcitas	..	2	..	1
2. Circulatory System:				
Carditis	..	..	1	..
Hypertrophia Cordis	1	1	3	1
Morbus Valv: Cordis	9	9	11	6
Aneurisma Aortæ	1	..	1	..
Aneurisma	..	1	..	2
Varix	1	2	3	3
Angina Pectoris	..	..	1	..

Abstract No. 11—*continued.*

Stations	Gibraltar.		Malta.	
Average Strength				
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
3. Respiratory System:				
Bronchitis Acuta	1	..	..	..
„ Chronica	6	1	8	2
Pleuritis	..	..	1	..
Pneumonia	1	1	1	..
Asthma..	1	..	1	..
4. Digestive System:				
Dyspepsia	..	..	..	1
Hernia..	..	1	6	5
Hæmorrhois	..	..	..	1
Hepatitis Chronica	1	1	16	3
5. Urinary System:				
Nephria	..	..	2	2
Fistula in Perinæo	1	1	..	..
Enuresis	..	..	1	..
Diabetes	..	1	..	1
7. Locomotive System:				
Arthritis	..	1	1	2
Contractura	..	..	1	..
Periostitis	1	..	..	1
Caries	1	..	..	..
Necrosis	1	1	..	..
8. Integumentary System:				
Eczema	..	1	..	1
Ulcus	4	1	2	..
IV. *Developmental Diseases.*				
4. Diseases of Nutrition:				
Atrophia	2	1	2	..
V. *Violent Deaths or Diseases.*				
1. Accidental:				
Explosio	1	..	..	..
Fractura	..	2	2	2
Vulnus Incisum	..	..	1	..
Luxatura	..	1	1	..
Subluxatio	1	..	..	..
Amputatio	..	1	..	..
Total	89	70	132	73

APPENDIX No. XXI—*continued.*

ABSTRACT No. 12, showing the Ages of the Troops serving in the Mediterranean Commands, and the Deaths at each Age, during the Year 1867.

Station.	Corps.	Under 20 Years.		20 and under 24.		25 and under 29.		30 and under 34.		35 and under 39.		40 and upwards.		Total	
		Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.	Strength on 1st January.	Died.
Gibraltar ..	Royal Engineers	7	..	46	..	127	1	85	..	24	2	6	..	295	3
	2nd Battalion 15th Foot ..	38	..	81	..	391	4	136	2	48	1	7	..	701	7
	87th Regiment..	140	..	162	1	102	2	148	..	168	1	1	..	721	4
Malta.. ..	Royal Engineers	9	..	15	..	98	..	47	..	15	1	..	..	184	1
	1st Battalion 8th Foot ..	83	1	233	7	245	9	79	9	39	2	5	1	684	29
	2nd „ 8th „ ..	15	..	53	2	519	3	112	3	48	1	5	..	752	9
	1st „ 24th „ ..	107	..	256	1	161	3	94	1	50	4	3	..	671	9
	Total	399	1	846	11	1,643	22	701	15	392	12	27	1	4,008	62
	Ratio per 1000	..	2·51	..	13·00	..	13·39	..	21·40	..	30·61	..	37·04	..	15·47

APPENDIX No. XXI—*continued.*

ABSTRACT No. 13, showing the Admissions into Hospital and Deaths among the Troops serving in British America in the Year 1867.

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda	
Average Annual Strength	11,240		3,337		280		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic Diseases:								
Variola	4	..	..	..	..	..	..	..
Morbilli	23	..	2	..	1	..	..	..
Scarlatina	5	..	2	..	..	..	..	..
Tonsillitis	348	1	66	..	6	..	8	..
Influenza	37	..	7	..	2	..	44	1
Coryza	1	..	..	..	..	..	..	..
Ophthalmia	190	..	90	..	..	..	31	..
Erysipelas	66	..	7	..	..	..	3	..
Furunculus	37	..	15	..	1	..	..	..
Anthrax	4	..	4	..	..	..	..	..
Pyæmia	1	1	..	..	..	..	..	..
Dysenteria Acuta	14	..	2	..	..	..	4	..
„ Chronica	3	1	..	..	..	..	..	..
Diarrhœa	245	..	84	..	5	..	81	..
Cholera	2	..	..	..	..	..	..	..
„ Spasmodica	2	1	..	..	..	..	..	..
Febris Intermittens	67	..	..	..	..	..	..	..
„ Remittens	7	..	3	..	1	..	1	..
„ Icterodes	..	..	..	..	..	..	4	3
„ Typhoides	7	3	6	..	..	..	11	4
„ Typhus	..	..	..	..	1	..	..	..
„ Continua	178	8	32	..	6	..	29	1
Rheumatismus Acutus	270	3	29	..	1	..	28	..
„ Chronicus	173	..	47	..	2	..	17	..
Parotitis	11	..	1	..	..	..	1	..
Cynanche Trachealis	1	..	..	..	..	..	..	..
2. Enthetic Diseases:								
Syphilis Primaria	881	..	87	..	2	..	16	..
„ Secundaria	250	..	51	..	4	..	21	..
Iritis Syphilitica	6	..	1	..	..	..	..	..
Bubo	234	..	16	..	..	..	1	..
Gonorrhœa	589	..	145	..	4	..	28	..
Phymosis, &c.	16	..	1	..	..	..	..	..
Orchitis (Gonorrhœal)	37	..	6	..	..	..	2	..
Strictura Urethræ	27	..	6	..	..	..	5	..
Verrucæ	5	..	..	..	..	..	1	..
Ulcus Penis	11	..	2	..	..	..	..	..
Ophthalmia (Gonorrhœal)	2	..	..	..	..	..	..	..
3. Dietic Diseases:								
Scorbutus	5	..	2	..	..	..	..	..
Purpura	2	..	1	..	..	..	..	..
Ebriositas	224	..	49	1	20	..	41	1
Bronchocele	..	..	1	..	..	..	..	..

Abstract No. 13—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	11,240		3,387		280		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic Diseases:								
Aphthæ	1	..	..	..	..	..	..	..
Porrigo	10	..	..	..	..	..	1	..
Scabies	68	..	10	..	1	..	2	..
Tænia Solium	6	..	..	..	..	..	2	..
Ascaris Lumbricoides	..	..	..	..	1	..	..	..
II. *Constitutional Diseases.*								
1. Diathetic Diseases:								
Podagra	3	..	..	..	..	..	..	..
Lumbago	28	..	1	..	..	..	4	..
Ischias	2	..	..	..	..	..	..	..
Anæmia	4	..	2	..	..	..	..	..
Anasarca	6	..	..	..	..	..	1	..
Tumores	11	..	2	..	..	..	1	..
Carcinoma	2	1	..	..	..	..	..	..
Lupus	1	..	..	..	..	..	..	..
2. Tubercular Diseases:								
Scrofula	15	..	4	..	..	..	2	..
Phthisis Pulmonalis	73	15	40	1	1	2	10	..
Hæmoptysis	25	..	..	..	1	..	2	..
III. *Local Diseases.*								
1. Nervous System:								
Encephalitis	2	1	..	..	..	..	..	..
Meningitis	..	..	1	1	..	..	..	..
Apoplexia	4	5	1	2	..	..	..	..
Paralysis	8	..	4	..	..	..	1	..
Delirium Tremens	57	5	11	..	1	..	23	3
Mania	15	..	1	..	..	..	1	..
Amentia	14	..	8	..	..	..	2	..
Epilepsia	13	1	6	..	..	..	2	..
Chorea	1	..	..	..	..	..	..	..
Cephalæa	40	..	1	..	..	..	8	..
Vertigo	3	..	..	..	..	..	..	..
Neuralgia	29	..	6	..	..	..	3	..
Dysecœa	4	..	1	..	..	..	1	..
Otitis	28	..	7	..	..	..	1	..
Iritis	..	..	1	..	..	..	2	..
Choroiditis	1	..	..	..	..	..	1	..
Amaurosis	1	..	..	..	..	..	..	..
Cæcitas	1	..	..	..	..	..	..	..
Cataractes	1	..	..	..	..	..	..	..
Myopia	..	..	3	..	..	..	..	..
Fistula Lachrymalis	1	..	..	..	..	..	..	..
Sclerotitis	1	..	..	..	..	..	..	..
Hemeralopia	..	..	..	..	..	..	1	..

Abstract No. 13—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	11,240		3,887		280		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Circulatory:								
Carditis	3	1	1	..	..	..	..	..
Pericarditis	..	1	1	..	..	..	..	..
Hypertrophia Cordis	7	..	2	..	..	..	2	..
Morbus Valv: Cordis	32	3	4	2	..	1	9	..
Palpitatio	5	..	..	..	..	..	..	..
Angina Pectoris	2	..	..	..	..	..	..	..
Aneurisma Aortæ	2	9	2	2	..	..	..	..
Aneurisma	..	..	..	..	..	..	1	..
Varix	10	..	3	..	..	..	1	..
3. Respiratory:								
Laryngitis	3	..	1	..	..	..	1	..
Bronchitis Acuta	471	2	62	..	14	..	27	1
„ Chronica	208	2	38	..	6	..	10	..
Pleuritis	38	..	13	..	..	..	2	..
Pleurodynia	4	..	2	..	..	..	..	..
Pneumonia	146	9	73	4	..	..	7	..
Asthma	5	..	1	..	..	..	1	..
Epistaxis	3	..	1	..	..	..	..	..
4. Digestive:								
Stomatitis	4	..	..	..	..	..	..	..
Glossitis	1	..	..	..	..	..	..	..
Gastritis	3	..	2	..	..	..	..	..
Enteritis	2	1	..	..	..	..	..	..
Peritonitis	..	2	..	..	..	..	..	..
Obstipatio	3	..	5	..	..	..	5	..
Dyspepsia	132	..	38	..	5	..	46	..
Colica	43	..	16	..	..	..	12	..
Hæmatemesis	2	..	..	..	..	..	..	..
Hernia	7	1	5	..	..	..	1	..
Intus-susceptio	1	1	..	..	..	..	..	..
Ileus	3	1	..	..	..	..	..	..
Hæmorrhois	32	..	12	..	2	..	10	..
Fistula in Ano	12	..	1	..	..	..	1	..
Splenitis	1	..	1	..	..	..	..	..
Hepatitis Acuta	13	..	..	..	..	..	2	..
„ Chronica	7	1	11	1	1	..	3	1
Icterus	62	..	2	..	..	..	1	..
Ascites	4	1	..	..	..	..	..	..
5. Urinary:								
Nephritis	2	..	1	..	1	..	..	..
Nephria	2	1	2	1	..	..	..	..
Ischuria	2	..	..	..	..	..	..	..
Hæmaturia	3	..	1	..	..	..	..	..
Cystitis	4	..	1	..	..	..	..	..
Fistula in Perineo	..	..	1	..	..	..	..	..
Enuresis	4	..	2	..	..	..	1	..
Diuresis	..	..	1	..	..	..	..	..

Abstract No. 13—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	11,240		3,387		280		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
6. Reproductive:								
Hydrocele	4	..	..	..	..	..	..	..
Orchitis (not Gonorrhœal)	66	..	20	..	..	..	13	..
Spermatorrhœa	..	..	1	..	..	..	..	..
7. Locomotive:								
Arthritis	9	..	..	..	..	..	1	..
Synovitis	10	..	5	..	..	..	..	..
Hydrarthrus	..	..	1	..	..	..	..	..
Contractura	2	..	..	..	..	..	..	..
Periostitis	8	..	1	..	..	..	1	..
Caries	..	..	..	..	..	..	2	..
Necrosis	1	..	..	..	..	..	..	..
Curvatura Spinæ	1	..	..	..	..	..	..	..
8. Integumentary:								
Urticaria	1	..	1	..	..	..	1	..
Eczema	45	..	16	..	..	..	1	..
Herpes	19	..	5	..	..	..	3	..
Impetigo	12	..	1	..	..	..	..	..
Psoriasis	29	..	11	..	..	..	..	..
Lichen	5	..	..	..	..	..	..	..
Lepra	2	..	..	..	..	..	..	..
Pemphigus	2	..	..	..	..	..	..	..
Acne	1	..	1	..	..	..	1	..
Rupia	1	..	..	..	..	..	..	..
Ecthyma	2	..	..	..	..	..	..	..
Prurigo	1	..	1	..	..	..	..	..
Pityriasis	1	..	..	..	..	..	1	..
Mentagra	1	..	..	..	..	..	..	..
Roseola	11	..	..	..	..	..	..	..
Chloasma	1	..	..	..	..	..	..	..
Phlegmon	375	..	77	..	11	..	88	..
Abscessus	193	..	26	..	2	..	19	..
Paronychia	41	..	7	..	..	..	13	..
Ulcus	399	..	60	..	9	..	32	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	44	..	6	..	2	..	9	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	58	..	19	..	1	..	2	..
Explosio	..	..	2	..	..	..	..	..
Gelatio	21	1	9	..	1	1	1	..
[illegible]nsoiatio	7	..	..	..	..	..	1	1
Submersio	..	15	..	4	..	..	..	1
Fractura	66	1	21	1	1	..	8	1
Amputatio	1	..	..	..	..	..	..	..
Contusio	432	..	102	..	11	..	70	..

Abstract No. 13—*continued.*

Stations	Canada.		Nova Scotia.		Newfoundland.		Bermuda.	
Average Annual Strength	11,240		3,387		280		1,249	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Commotio	1	1	1	..	..	..	..	1
Vulnus Sclopetarium	7	..	..	..	..	..	..	..
„ Incisum	178	..	50	..	3	..	36	..
Luxatura	12	..	3	..	..	..	1	..
Subluxatio	271	..	67	..	2	..	19	..
Vesiculæ Pedis	36	..	4	..	..	..	8	..
Morsus Equi	1	..	..	..	..	..	..	..
„ Insecti	2	..	..	..	..	..	..	..
„ Canis	5	..	1	..	..	..	..	..
„ Ursi	1	..	..	..	..	..	..	..
„ Hominis	7	..	2	..	..	..	..	..
„ Porci	2	..	..	..	..	..	..	..
„ Procyonis	1	..	..	..	..	..	..	..
3. Homicidal								
Vulnus Sclopetarium	..	2	..	..	..	..	..	..
Fractura	..	..	1	1	..	..	..	..
4. Suicidal:								
Vulnus Sclopetarium	..	3	..	..	..	..	1	2
„ Incisum	..	1	1	..	..	..	..	..
Submersio	..	..	..	..	..	1	..	..
6. Punitus	13	..	4	..	..	..	..	..
No appreciable disease	27	..	..	..	..	..	..	..
Total	8,198	106	1,658	21	133	5	923	21

Causes of the Deaths of the Invalids.

Diseases.	Canada.	Nova Scotia, &c.	Bermuda.
Phthisis Pulmonalis	1	3	1
Morbus Valv: Cordis	2	1	..
Emphysema	1	..	..
Necrosis	..	1	..
Fractura Cranii	1	..	..
Total	5	5	1

APPENDIX No. XXI—*continued.*

ABSTRACT No. 14, showing the Number of Invalids sent Home from British America and of Men finally discharged the service as Invalids in British America and at the Invalid Depôt in England in the Year 1867.

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	British America.	Bermuda.		From British America.	From Bermuda.
I. *Zymotic Diseases.*					
1. Miasmatic:					
Ophthalmia	6	1	1	6	..
Erysipelas	1	..	..	..	..
Dysenteria Chronica .	1	..	..	..	..
Diarrhœa	2	..	..	..	..
Febris Intermittens..	1	..	..	..	..
Rheumatismus Acutus	3	..	1	..	..
„ Chron:	10	..	..	7	..
2. Enthetic:					
Syphilis Secundaria ..	7	2	..	1	1
Strictura Urethræ ..	1	..	..	..	..
II. *Constitutional Diseases.*					
1. Diathetic:					
Anæmia	1	..	..	..	..
Anasarca	..	..	1	..	..
Tumores	..	..	1	..	..
2. Tubercular:					
Scrofula	3	..	..	2	..
Phthisis Pulmonalis..	57	9	7	57	11
Hæmoptysis	5	..	..	..	..
Tuberculosis	..	..	..	2	..
III. *Local Diseases.*					
1. Nervous:					
Encephalitis	1	..	..	..	..
Paralysis	4	1	2	6	1
Delirium Tremens ..	..	..	1	..	..
Mania	5	1	..	..	..
Amentia	10	2	..	..	..
Epilepsia	4	..	..	3	..
Cephalæa.	2	..	..	..	..
Otitis..	..	..	1	..	..
Myopia	3	..	..	..	..
Cæcitas	..	..	2	..	1
2. Circulatory:					
Carditis	..	..	..	1	..
Hypertrophia Cordis	7	1	..	..	..
Morbus Valv: „	13	1	5	17	2
Aneurisma Aortæ ..	3	..	..	..	..
Aneurisma	..	..	..	3	..
Varix..	4	1	1	2	1

Abstract No. 14—*continued.*

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	British America.	Bermuda.		From British America.	From Bermuda.
3. Respiratory:					
Bronchitis Acuta ..	10	..	..	1	..
Bronchitis Chronica..	10	..	3	3	..
Pleuritis	..	..	1	1	..
Pneumonia	2	..	..	3	..
Asthma	..	..	..	2	..
4. Digestive:					
Dyspepsia	1	..	..	..	..
Colica	..	1	..	..	..
Hernia	7	..	2	3	..
Prolapsus Ani ..	..	1	..	..	1
Hepatitis Chronica ..	2	..	..	4	..
5. Urinary:					
Nephria	2	..	..	2	..
Cystitis	1	..	1	..	..
6. Reproductive:					
Orchitis (not Gonor:)	2	..	1	1	..
7. Locomotive:					
Arthritis	2	..	1	1	..
Contractura	..	..	..	2	..
8. Integumentary:					
Psoriasis	1	..	..	1	..
Phlegmon	1	..	..	..	..
Abscessus	1	..	..	..	..
Ulcus..	5	..	3	3	..
IV. *Developmental Diseases.*					
4. Diseases of Nutrition:					
Atrophia	6	3	1	3	..
V. *Violent Deaths or Diseases.*					
1. Accidental:					
Explosio	..	..	1	..	..
Gelatio	..	..	..	1	..
Fractura	3	..	..	3	..
Luxatura	..	..	2	..	..
Subluxatio	2	..	..	1	..
Total	212	24	39	142	18

APPENDIX No. XXI—*continued.*

ABSTRACT No. 15, showing the Ages of the Troops serving in British North America, and the Deaths at each Age, during the Year 1867.

Station.	Corps.	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
		Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
British North America.	13th Hussars ..	39	..	151	1	202	1	60	..	17	..	5	..	474	2
	4th Brig. Rl. Art.	3	..	231	1	582	5	307	4	50	2	10	..	1,180	12
	Royal Engineers ..	6	..	67	..	183	1	74	1	25	1	4	..	360	3
	2nd Bn. 4th Foot	16	..	180	..	401	2	90	1	33	1	..	..	720	4
	1st „ 15th „	6	..	212	2	332	5	67	2	38	1	6	..	661	10
	1st „ 16th „	67	..	340	..	219	..	32	2	13	2	2	..	673	4
	2nd „ 17th „	15	1	108	..	591	3	7	1	4	..	5	..	730	5
	1st „ 22nd „	10	..	147	1	434	..	63	2	43	1	3	..	700	4
	30th Foot	124	..	235	2	253	2	77	1	33	..	1	..	723	5
	47th „	149	..	176	2	201	..	115	..	32	..	8	..	681	2
	53rd „	82	2	203	1	265	3	115	..	38	..	1	..	704	6
	4th Bn. 60th Foot	30	1	136	1	381	3	145	1	32	1	4	..	728	7
	100th Foot ..	41	..	128	1	314	9	206	2	95	2	4	1	788	15
	1st Bn. Rifle Brig.	73	..	273	2	227	1	102	..	25	..	..	..	700	3
	Rl. Canadian Rifles	35	..	22	..	97	1	511	3	414	13	165	6	1,244	23
Bermuda	Royal Artillery ..	4	..	17	..	85	2	61	3	13	2	..	..	180	7
	Royal Engineers ..	15	1	57	..	88	1	78	..	30	1	2	1	270	4
	61st Foot	8	1	241	1	378	5	84	1	78	2	2	..	780	10
	Total	723	6	2,924	15	5,233	44	2,194	24	1,008	28	228	8	12,310	125

APPENDIX No. XXI—*continued.*

ABSTRACT No. 16, showing the Admissions into Hospital and Deaths among the White Troops serving in the Windward and Leeward Command and Jamaica, in the Year 1867; the disabilities of the Invalids sent home, and of those Discharged the Service at Netley during the same period.

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	806		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
I. *Zymotic Diseases.*												
1. Miasmatic:												
Tonsillitis	19	..	18	..	1	..	5	..	..	..	..	..
Influenza	3	..	1	..	2	..	..	..	..	..	..	..
Ophthalmia	13	..	8	..	5	..	10	..	..	..	1	..
Erysipelas	2	..	1	..	1	..	..	..	..	..	..	..
Furunculus	13	..	5	..	8	..	2	..	..	..	..	..
Anthrax	..	..	..	..	1	..	1	..	..	..	..	..
Dysenteria Acuta	17	1	16	1	1	..	15	1	1	..	..	..
„ Chronica	1	..	1	..	..	..	4	..	..	..	..	..
Diarrhœa	10	..	9	..	1	..	36	..	1	..	..	..
Febris Intermittens	41	..	20	..	19	..	10	..	1	..	..	..
„ Remittens	14	1	11	..	3	1	211	2	1	..	..	..
„ Typhoides	..	..	..	..	..	..	3	1	..	..	..	..
„ Continua	24	..	23	..	1	..	80	3	..	..	..	..
„ Icterodes	2	1	2	1	..	..	90	38	..	..	..	..

Abstract No. 16—continued.

Stations..	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	866		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
Rheumatismus Acutus.	..	..	..	..	..	..	13	..	..	..	..	..
„ Chronicus	10	..	10	..	..	..	25	..	..	2	1	1
2. Enthetic:												
Syphilis Primaria	39	..	39	..	10	..	18	..	..	..	..	..
„ Secundaria	16	..	15	..	1	..	7	..	1	..	..	..
Iritis Syphilitica	..	..	..	..	..	..	1	..	..	..	..	..
Bubo	40	..	36	..	4	..	9	..	..	..	..	..
Gonorrhœa	102	..	99	..	3	..	25	..	..	..	..	..
Phymosis, &c.	1	..	1	..	..	..	..	..	..	..	..	..
Orchitis (Gonorrhœal)	6	..	6	..	..	..	1	..	..	..	..	..
Stricture Urethræ	2	..	2	..	..	..	1	..	..	..	..	..
3. Dietic:												
Ebriositas	41	..	33	..	8	..	20	1	..	..	..	..
4. Parasitic:												
Porrigo	1	..	..	..	1	..	..	..	..	..	..	..
Scabies	..	..	..	..	..	..	3	..	..	..	..	..

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Abstract No. 16—*continued.*

Stations..	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	806		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
3. Respiratory System:												
Bronchitis Acuta	13	..	12	..	1	..	19	..	..	..	..	..
„ Chronica	7	..	6	..	2	..	6	..	1	1	..	..
Pleuritis	4	..	3	..	1	..	..	..	..	..	..	..
Pleurodynia	1	..	1	..	..	..	..	..	..	..	..	..
Pneumonia	1	..	1	..	..	..	1	1	..	..	..	..
Apoplexia Pulmonalis	..	..	..	..	..	..	1	..	..	..	..	..
Asthma	..	..	..	..	..	..	1	..	..	1	..	..
4. Digestive System:												
Gastritis	1	..	..	..	1	..	1	..	..	1	..	..
Peritonitis..	2	1	2	1	..	..	2	..	..	..	..	..
Obstipatio	..	..	..	..	..	..	1	..	..	..	..	..
Dyspepsia	35	..	25	..	3	..	13	..	..	..	..	..
Colica	10	..	7	..	2	..	8	..	..	..	..	..
Hernia	2	..	2	..	..	..	..	..	1	..	2	..
Hæmorrhois	5	..	5	..	..	..	7	..	..	..	..	..
Fistula in ano	2	..	2	..	..	..	..	..	..	..	..	..

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Abstract No. 16—*continued*.

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	806		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
V. Violent Deaths or Diseases.												
1. Accidental:												
Ambustio	6	..	5	..	1	..	5	..	..	..	..	..
Explosio	4	..	..	..	4	..	..	..	..	..	..	..
Insolatio	..	..	..	..	..	..	1	..	..	..	..	..
Fractura	4	..	2	..	2	..	6	..	..	..	..	..
Ruptura Hepatis	..	1	..	1	..	..	..	..	..	..	..	..
Contusio	22	..	19	..	3	..	47	1	..	..	..	..
Vulnus Sclopetarium	..	..	..	..	..	..	2	..	..	..	..	..
„ Incisum	28	..	25	..	3	..	26	..	..	..	..	..
Luxatura	3	..	1	..	2	..	..	..	..	1	..	..
Subluxatio	19	..	10	..	9	..	11	..	..	..	..	..
Vesiculæ Pedis	7	..	5	..	2	..	..	..	..	..	..	..
Morsus Hominis	2	..	2	..	..	..	..	..	..	..	..	..
6. Punitus	2	..	2	..	..	..	2	..	..	..	..	..
Total	866	8	718	6	147	2	940	55	37	17	16	7

Abstract No. 16—*continued.*

Causes of Deaths of the Invalids.

	Jamaica.	Windward and Leeward Command.
Phthisis Pulmonalis	1	1

APPENDIX No. XXI—*continued.*

ABSTRACT No. 17, showing the Admissions into Hospital and Deaths among the Black Troops serving in the Windward and Leeward Command, Jamaica Honduras, and Bahamas, in the Year 1867, and the Disabilities of those Discharged the Service as Invalids during the same period.

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Honduras.		Bahamas.		Black Troops in West Indies and Africa.
			Barbadoes.		Demerara.								
Average Strength	603		437		156		722		363		392		3,095
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Discharged as Invalids.
I. Zymotic Diseases.													
1. Miasmatic:													
Variola	..	..	..	..	..	..	1	..	..	..	..	..	..
Varioloides	..	..	..	..	..	..	1	..	..	..	..	..	..
Varicella	1	..	1	..	..	..	..	..	..	..	..	..	..
Tonsillitis	1	..	1	..	..	..	10	..	3	..	4	..	..
Ophthalmia	3	..	..	..	3	..	25	..	4	..	5	..	1
Furunculus	..	..	..	..	..	..	5	..	3	..	2	..	..
Anthrax	..	..	..	..	..	..	..	..	..	..	2	..	..
Dysenteria Acuta	15	..	5	..	10	..	12	..	21	..	1	..	..
„ Chronica	5	..	4	..	1	..	1	..	5	..	..	..	2
Diarrhœa	6	..	2	..	4	..	22	..	45	1	5	..	..
Febris Intermittens	25	1	8	1	17	..	8	..	9	..	18	..	..
„ Remittens	5	..	2	..	3	..	5	..	34	..	4	..	..

Febris Typhoides	..	..	..	1	..	1	..	..	..	3	1	..	..	1	..	..
„ Continua	..	..	..	7	1	3	1	4	..	105	4	..	..	31	1	..
Rheumat: Acutus	..	..	..	1	..	..	..	1	..	7	..	6	..	8	..	..
„ Chronicus	..	..	..	40	2	6	..	34	2	75	..	9	..	22	..	10
2. Enthetic:																
Syphilis Primaria	..	..	..	137	..	110	..	27	..	147	..	41	..	87	..	..
„ Secundaria	..	..	..	15	..	11	..	4	..	21	..	2	..	4	..	6
Cachexia Syphiloidea	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	1
Iritis Syphilitica	..	..	..	4	..	4	..	..	..	2	..	..	..	1	..	1
Bubo	..	..	..	10	..	9	..	1	..	28	..	2	..	11	..	..
Gonorrhœa	..	..	..	119	..	105	..	14	..	116	..	24	..	91	..	..
Phymosis, &c.	..	..	..	2	..	2	..	..	..	1	..	..	..	..	..	..
Orchitis (Gonorrhœal)	..	..	..	5	..	5	..	..	..	2	..	2	..	7	..	..
Strictura Urethræ	..	..	..	3	..	3	..	..	..	2	..	1	..	5	..	..
3. Dietic:																
Ebriositas	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..
4. Parasitic:																
Scabies	..	..	..	2	..	..	..	2	..	4	..	2	..	..	..	..
Tænia Solium	..	..	..	..	..	..	..	..	..	5	..	..	..	..	..	..
Ascaris Lumbricoides	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..
Dracunculus	..	..	..	..	..	..	..	..	..	3	..	4	..	..	..	..
Vermes	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
II. Constitutional Diseases.																
1. Diathetic:																
Lumbago	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..
Anæmia	..	..	..	..	2	..	..	..	2	..	..	1	..	..	..	2
Anasarca	..	..	..	..	1	1	..	..	1	1	2	..	..	..	4	..	1
Tumores	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..
2. Tubercular Diseases:																
Scrofula	..	..	..	..	5	..	4	..	1	..	5	..	1	..	6	..	4

Abstract No. 17—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Honduras.		Bahamas.		Black Troops in West Indies and Africa.
			Barbadoes.		Demerara.								
Average Strength	603		437		156		722		363		392		3,095
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Discharged as Invalids.
Phthisis Pulmonalis	20	8	17	6	3	2	17	6	2	1	4	4	12
Hæmoptysis	..	..	..	..	..	..	1	..	..	..	1	..	..
III. *Local Diseases.*													
1. Nervous System:													
Apoplexia	1	..	..	..	1	..	..	..	..	..	..	..	..
Paralysis	2	1	1	..	1	1	..	..	..	..	1	..	1
Mania	1	..	1	..	..	..	4	..	..	..	..	..	2
Amentia	1	..	..	..	1	..	5	1	..	..	..	..	1
Epilepsia	5	2	4	1	1	1	6	..	1	..	5	..	4
Cephalæa	11	..	1	..	10	..	3	..	3	..	1	..	..
Neuralgia	3	..	..	..	3	..	1	..	..	..	1	..	..
Otitis	..	..	..	..	..	..	1	..	..	..	1	..	..
Nyctalopia	..	..	..	..	..	..	..	..	..	..	1	..	..
2. Circulatory System:													
Hypertrophia Cordis	..	1	..	1	..	..	..	..	..	..	..	..	..
Morbus Valvæ Cordis	2	2	1	1	1	1	1	..	..	..	1	1	2
Endocarditis	..	..	..	..	..	..	..	..	..	..	..	..	1

| | | |

Abstract No. 17—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Honduras.		Bahamas.		Black Troops in West Indies and Africa.
			Barbadoes.		Demerara.								
Average Strength	603		437		156		722		363		392		3,095
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Discharged as Invalids.
7. Locomotive System:													
Arthritis	..	..	..	..	..	..	..	..	..	..	2	..	1
Synovitis	1	..	1	..	1	..	..	..	1	..	1	..	1
Caries	1	..	..	..	1	..	1	..	..	..	1	..	2
Necrosis	..	..	..	..	..	..	1	..	..	..	..	..	..
Integumentary System:													
Urticaria	1	..	..	..	2	..	..	..	..	..	..	..	..
Eczema	..	..	..	..	..	..	3	..	3	..	1	..	..
Herpes	2	..	..	..	..	..	1	..	..	..	..	..	..
Impetigo	..	..	..	..	..	..	..	..	2	..	..	..	..
Psoriasis	1	..	..	..	1	..	1	..	..	..	3	..	..
Phlegmon	11	..	7	..	4	..	20	..	4	..	6	..	..
Abscessus	9	..	5	..	4	..	13	..	4	..	2	..	1
Paronychia	..	..	..	..	..	..	4	..	2	..	2	..	..
Ulcus	22	..	15	..	7	..	31	..	27	..	44	..	1
IV. *Developmental Diseases.*													
4. Diseases of Nutrition:													
Atrophia	..	..	..	..	..	..	1	..	6	..	..	..	1

V. *Violent Deaths or Diseases.*																				
1. Accidental:																				
Ambustio	2	..	1	..	1	..		..	..	..	2	..	..							
Insolatio	..	..	..	..	..	..	..	..	1	1	..	..	..							
Submersio	..	..	..	..	..	..	..	..	..	1	..	..	..							
Fractura	..	..	..	..	..	..	1	..	..	..	2	..	..							
Amputatio	..	..	..	..	..	..	1	..	..	..	..	..	..							
Contusio	11	..	1	..	10	..	17	..	6	1	21	..	..							
Vulnus Sclopetarium	1	..	..	..	1	..	1	..	..	..	1	..	2							
„ Incisum	24	..	16	..	8	..	25	..	6	..	10	..	..							
Subluxatio	5	..	4	..	1	..	6	..	..	..	1	..	..							
Vesiculæ Pedis	1	..	1	..	..	..	3	..	..	..	..	..	..							
Morsus Hominis	..	..	..	..	..	..	1	..	..	..	..	..	..							
2. In Battle:																				
Vulnus Sclopetarium	..	..	..	..	..	..	..	..	3	1	..	..	..							
4. Suicidal:																				
Vulnus Sclopetarium	..	..	..	..	..	..	..	1	..	..	..	..	..							
6. Punitus	2	..	1	..	1	..	..	..	..	..	1	..	..							
Total	629	23	400	13	229	10	948	21	323	8	473	9	69							

Abstract No. 17—*continued.*

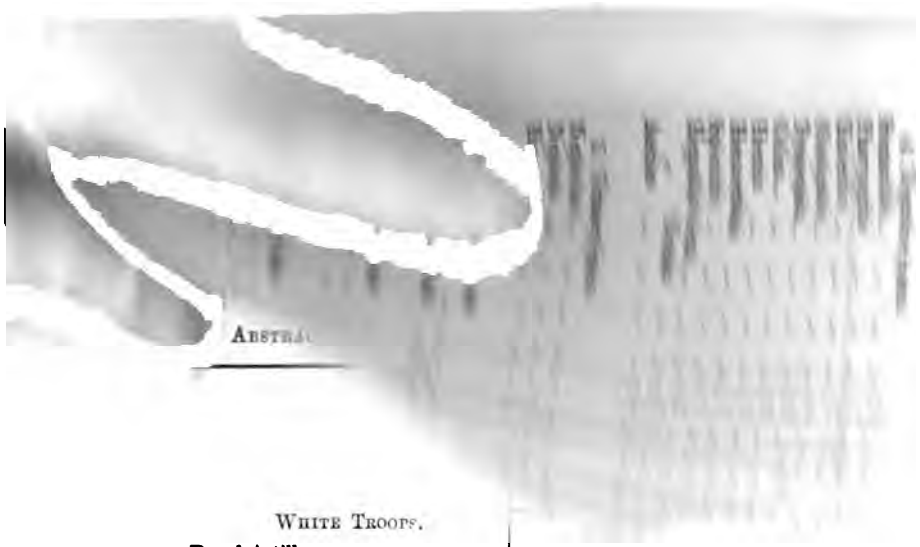
	Windward and	Subordinate Stations.	Jamaica.	Honduras.	Bahamas.	Black Troops in W[illegible]

Abstract No. 18—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	508		189		238		80	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Tetanus	..	..	1	1	..	..	..	..
Cephalæa	2	..	..	..	1	1	..	..
Neuralgia	1	..	..	..	1	..	2	..
Otitis	1	..	..	..	..	..	..	..
2. Circulatory System:								
Carditis	6	..	..	..	..	..	..	..
Pericarditis	1	..	..	..	..	..	..	..
Aneuriama	..	..	..	..	..	..	..	1
3. Respiratory System:								
Bronchitis Acuta	25	..	2	..	29	..	1	..
„ Chronica	8	..	2	..	2	..	..	..
Pleuritis	6	1	5	..	1	..	..	..
Pleurodynia	..	..	1	..	2	..	..	..
Pneumonia	5	1	5	3	2	1	..	..
4. Digestive System:								
Stomatitis	1	..	..	..	..	..	..	..
Pharyngitis	1	..	..	..	..	..	..	..
Enteritis	1	1	..	..	..	..	..	..
Obstipatio	4	..	..	..	..	..	1	..
Dyspepsia	3	..	6	..	..	..	..	..
Colica	6	..	..	..	5	..	..	..
Hernia	1	..	..	..	..	..	1	..
Hæmorrhois	1	..	..	..	..	..	..	..
Splenitis	1	..	..	..	..	..	2	..
Hepatitis Acuta	2	..	..	..	1	..	3	
„ Chronica	2	1	..	..	..	..	..	..
Ascites	3	1	..	..	..	..	..	..
5. Urinary System:								
Nephritis	..	..	..	..	4	1	1	..
Nephria	..	1	..	..	..	..	..	..
Hæmaturia	..	..	1	..	1	..	..	..
6. Reproductive System:								
Hydrocele	..	..	..	..	1	..	..	..
Orchitis (not Gonorrhœal)	2	..	3	..	2	..	1	..
7. Locomotive System:								
Arthritis	..	..	1	..	5	1	..	..
Periostitis	..	..	..	..	4	..	..	..
8. Integumentary System:								
Eczema	..	..	2	..	..	..	..	..
Herpes	2	..	2	..	..	..	..	..
Impetigo	1	..	..	..	..	..	..	..
Psoriasis	..	..	..	..	2	..	..	..

Abstract No. 16—*continued.*

Stations..	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	806		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
Rheumatismus Acutus.	..	..	..	..	..	..	13	..	..	..	..	..
„ Chronicus	10	..	10	..	..	..	35	..	..	2	1	1
2. Enthetic:												
Syphilis Primaria	29	..	29	..	10	..	18	..	..	..	..	..
„ Secundaria	16	..	15	..	1	..	7	..	1	..	..	..
Iritis Syphilitica	..	..	..	..	..	..	1	..	..	..	..	..
Bubo	40	..	36	..	4	..	9	..	..	..	..	..
Gonorrhœa	102	..	99	..	3	..	25	..	..	..	..	..
Phymosis, &c.	1	..	1	..	..	..	..	..	..	..	..	..
Orchitis (Gonorrhœal)	6	..	6	..	..	..	..	..	..	..	..	..
Stricture Urethræ	2	..	2	..	..	..	1	..	..	..	..	..
3. Dietic:												
Ebriositas	41	..	38	..	3	..	29	1	..	..	..	..
4. Parasitic:												
Porrigo	1	..	..	..	1	..	..	..	..	..	..	..
Scabies	..	..	..	..	..	..	3	..	..	..	..	..



White Troops.											
Royal Artillery											
2nd Batt. 16th Foot	38										
Total	**43**	..									
Black Troops.											
Additional Artillery	..	..	23								
1st West India Regiment	119	..	184	1							
2nd „ „	109	3	215	6							
3rd „ „	286	..	127	7	135						
4th „ „	194	1	280	9	110	1					
Military Labourers	8	..	35	1	63	..					
Total	**716**	**4**	**864**	**37**	**691**	**34**	**306**	**14**	**221**		

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Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic Diseases:										
Aphthæ	..	..	1	..	..	..	..	..	..	..
Porrigo	..	..	6	..	..	..	..	..	..	..
Scabies	9	..	26	..	..	..	..	..	40	..
Tænia Solium	..	..	11	..	1	..	4	..	..	..
Vermes	..	..	2	..	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Lumbago	..	..	9	..	1	..	..	..	..	..
Anæmia	..	..	5	..	1	..	6	..	1	..
Anasarca	..	..	5	..	..	..	2	..	6	1
Tumores	..	..	1	..	2	..	2	..	..	..
Carcinoma	..	..	..	..	..	..	..	..	1	..
2. Tubercular Diseases:										
Scrofula	..	..	10	..	..	..	2	..	..	..
Phthisis Pulmonalis	..	..	43	4	6	1	11	1	3	1
Hæmoptysis	..	..	3	..	2	..	8	..	..	..
III. *Local Diseases.*										
1. Nervous System:										
Encephalitis	..	..	..	..	..	..	1	1	..	..
Apoplexia	..	..	..	4	..	..	..	..	1	..
Paralysis	..	..	12	..	..	..	1	..	..	..
Delirium Tremens	..	1	15	2	6	..	5	..	1	..
Mania	..	..	7	..	..	..	1	..	1	..
Amentia	..	1	13	..	..	..	..	..	2	..
Epilepsia	..	..	19	..	..	..	..	..	..	..
Convulsio	..	2	..	..	..	..	..	..	..	..
Cephalæa	..	12	25	..	4	..	1	..	..	..
Neuralgia	..	..	4	..	1	..	3	..	..	..
Dysecœa	..	..	3	..	..	..	2	..	..	..
Otitis	..	..	8	..	5	..	5	..	1	..
Glaucoma	..	1	..	..	..	..	..	..	..	..
Cæcitas	..	..	1	..	..	..	..	..	..	..
Iritis	..	..	1	..	..	..	..	..	..	..
Myopia	..	..	..	..	1	..	..	..	..	..
2. Circulatory:										
Pericarditis	..	..	2	..	..	..	..	..	..	..
Hypertrophia Cordis	..	..	15	..	..	..	14	..	..	..
Morbus Valv: „	5	1	18	4	2	1	3	1	..	..
Palpitatio	..	2	5	..	1	..	..	..	..	..
Aneurisma Aortæ	..	..	2	1	..	..	..	..	..	..
„	..	..	..	..	..	..	1	..	..	..
Varix	..	1	..	..	..	..	5	..	..	..
Phlebitis	..	..	..	..	..	..	1	..	..	..

Abstract No. 16—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Invalids.			
			Barbadoes.		Trinidad.				Sent Home from		Discharged at the Invalid Depôt from	
Strength	806		658		143		788					
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	West Indies.	Jamaica.	West Indies.	Jamaica.
V. *Violent Deaths or Diseases.*												
1. Accidental:												
Ambustio	6	..	5	..	1	..	5	..	..	..	..	..
Explosio	4	..	..	..	4	..	..	..	..	..	..	..
Insolatio	..	..	..	..	..	..	1	..	..	..	..	..
Fractura	4	..	2	..	2	..	6	..	..	..	..	..
Ruptura Hepatis	..	1	..	1	..	..	..	..	..	..	..	..
Contusio	22	..	19	..	3	..	47	1	..	..	..	..
Vulnus Sclopetarium	..	..	..	..	..	..	2	..	..	..	..	..
„ Incisum	28	..	25	..	3	..	26	..	..	..	..	..
Luxatura	3	..	1	..	2	..	..	..	..	1	..	..
Subluxatio	19	..	10	..	9	..	11	..	..	..	..	..
Vesiculæ Pedis	7	..	5	..	2	..	..	..	..	..	..	..
Morsus Hominis	2	..	2	..	..	..	..	..	..	..	..	..
6. Punitus	2	..	2	..	..	..	2	..	..	..	..	..
Total	866	8	718	6	147	2	940	55	37	17	16	7

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic Diseases:										
Aphthæ	..	..	1	..	..	..	..	..	..	..
Porrigo	..	..	6	..	..	..	..	..	..	..
Scabies	9	..	26	..	..	..	..	..	40	..
Tænia Solium	..	..	11	..	1	..	4	..	..	..
Vermes	..	..	2	..	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Lumbago	..	..	9	..	1	..	..	..	..	..
Anæmia	..	..	5	..	1	..	6	..	1	..
Anasarca	..	..	5	..	..	..	2	..	6	1
Tumores	..	..	1	..	2	..	2	..	..	..
Carcinoma	..	..	..	..	..	..	..	..	1	..
2. Tubercular Diseases:										
Scrofula	..	..	10	..	..	..	2	..	..	..
Phthisis Pulmonalis	..	..	43	4	6	1	11	1	3	1
Hæmoptysis	..	..	3	..	2	..	8	..	..	..
III. *Local Diseases.*										
1. Nervous System:										
Encephalitis	..	..	..	..	..	..	1	1	..	..
Apoplexia	..	..	..	4	..	..	..	..	1	..
Paralysis	..	..	12	..	..	..	1	..	..	..
Delirium Tremens	1	..	15	2	6	..	5	..	1	..
Mania	..	..	7	..	..	..	1	..	1	..
Amentia	1	..	13	..	..	..	..	..	2	..
Epilepsia	..	..	19	..	..	..	..	..	..	..
Convulsio	2	..	..	..	..	..	..	..	..	..
Cephalæa	12	..	25	..	4	..	1	..	..	..
Neuralgia	..	..	4	..	1	..	3	..	..	..
Dysecoea	..	..	3	..	..	..	2	..	..	..
Otitis	..	..	8	..	5	..	5	..	1	..
Glaucoma	..	..	..	..	..	..	..	..	..	..
Cataract	..	..	1	..	..	..	..	..	..	..
Lesio	..	..	1	..	..	..	..	..	..	..
Myopia	..	..	..	..	1	..	..	..	..	..

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritiu.		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
3. Respiratory System:										
Laryngitis	..	..	1	..	..	..	..	..	..	..
Bronchitis Acuta	..	..	130	2	18	..	21	..	56	..
„ Chronica	..	..	25	1	5	..	13	..	9	..
Pleuritis	1	..	7	..	2	..	1	..	1	..
Pneumonia	1	1	29	3	..	..	1	..	1	..
Apoplexia Pulmonalis	..	..	2	..	..	..	..	..	..	..
Asthma	..	..	5	..	1	..	..	..	17	..
Emphysema	..	..	..	..	1	..	..	..	..	..
Epistaxis	..	..	2	..	..	..	1	..	..	..
4. Digestive System:										
Pharyngitis	..	..	1	..	..	..	..	..	..	..
Stomatitis	..	..	..	..	..	..	..	..	1	..
Gastritis	..	..	2	..	..	..	2	..	..	..
Enteritis	..	..	1	..	..	..	..	..	..	..
Obstipatio	..	..	2	..	..	..	2	..	2	..
Dyspepsia	1	..	129	..	14	..	26	..	5	..
Colica	1	..	7	..	4	..	1	..	18	1
Hæmatemesis	..	..	8	..	1	..	..	..	..	..
Hernia	..	..	10	..	..	..	..	..	1	..
Hæmorrhois	4	..	25	..	3	..	6	..	1	..
Fistula in ano	..	..	5	..	3	..	..	..	..	..
Splenitis	..	..	4	..	..	..	4	..	..	..
Hepatitis Acuta	..	..	15	1	18	1	25	2	1	..
„ Chronica	..	..	13	1	7	2	14	1	..	..
Icterus	..	..	6	..	1	..	5	..	1	..
Ascites	..	..	1	..	..	.	1	..	1	1
5. Urinary System:										
Nephritis	..	..	4	..	1	..	..	..	..	..
Nephria	..	..	4	..	..	..	..	..	1	..
Ischuria	..	..	..	..	..	..	1	..	..	..
Hæmaturia	..	..	..	..	1	..	1	..	..	..
Cystitis	..	..	2	..	..	..	1	..	..	..
Fistula in Perineo	..	..	3	..	..	..	..	..	..	..
Enuresis	..	..	2	..	..	..	2	..	..	..
Diuresis	..	..	2	..	..	..	..	..	..	..
Diabetes	..	..	1	..	..	..	..	..	..	..
6. Reproductive System:										
Varicocele	..	..	..	..	..	..	2	..	1	..
Hydrocele	..	..	10	..	..	..	..	..	1	..
Orchitis (not Gonorrhœal)	4	..	75	..	3	..	13	..	3	..
7. Locomotive System:										
Arthritis	..	..	2	..	..	..	2	..	..	..
Synovitis	2	..	9	..	..	..	..	..	..	..
Contractura	1	..	1	..	..	..	..	..	..	..
Periostitis	..	..	10	..	2	..	1	..	..	..
Exostosis	..	..	1	..	..	..	..	..	..	..
Caries	..	..	1	..	..	..	..	..	..	..
Necrosis	..	..	1	..	..	..	..	..	..	..
Hydrarthrus	..	..	1	..	..	..	..	..	..	..

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon.			
							White.		Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
8. Integumentary System:										
Eczema	1	..	19	..	4	..	..	..	4	..
Herpes	1	..	4	..	1	..	2	..	1	..
Impetigo	..	..	5	..	..	..	2	..	..	..
Psoriasis	..	..	7	..	2	..	..	..	2	..
Rupia	..	..	1	..	..	..	..	..	..	..
Pemphigus	..	..	..	..	..	..	..	..	1	..
Pityriasis	..	..	..	..	..	..	1	..	..	..
Acne	..	..	..	..	..	..	2	..	..	..
Phlegmon	2	..	200	..	10	..	8	..	17	..
Abscessus	1	..	86	..	17	..	41	..	24	..
Paronychia	..	..	13	..	1	..	3	..	2	..
Ulcus	8	..	275	..	23	..	65	..	61	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	1	..	22	..	9	..	9	..	1	1
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	..	..	21	..	4	..	..	..	2	..
Insolatio	..	..	..	..	..	..	1	..	1	..
Submersio	..	..	..	2	..	..	..	1	..	..
Fractura	1	..	27	1	2	..	8	1	3	..
Suffocatio	..	..	..	2	..	..	..	..	..	..
Contusio	4	..	291	..	23	..	58	..	29	..
Commotio	..	..	4	1	..	..	1	..	..	..
Vulnus Sclopetarium	..	..	7	..	..	..	..	..	..	..
„ Incisum	6	..	77	..	16	..	25	..	21	..
Luxatura	..	..	8	..	3	..	..	..	2	..
Subluxatio	3	..	88	..	17	..	18	..	9	..
Vesiculæ Pedis	..	..	16	..	..	..	16	..	3	..
Morsus Canis	..	..	..	..	..	..	..	..	1	..
4. Suicidal:										
Vulnus Incisum	1	..	..	..	1	..	..	..	..	..
„ Solopetarium	..	..	..	1	..	1	..	..	..	..
6. Punitus	1	..	8	..	5	..	..	..	..	..
No appreciable disease	..	..	..	..	1	..	1	..	..	..
Unknown	..	..	..	..	..	..	..	..	..	1
Total	233	2	5,280	42	2,889	46	1,000	11	898	11

Abstract No. 17—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Honduras.		Bahamas.		Black Troops in West Indies and Africa.
			Barbadoes.		Demerara.								
Average Strength	603		437		156		722		363		392		3,095
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Discharged as Invalids.
Phthisis Pulmonalis	20	8	17	6	3	2	17	6	2	1	4	4	12
Hæmoptysis	..	..	..	..	..	..	1	..	..	..	1	..	..
III. *Local Diseases.*													
1. Nervous System:													
Apoplexia	1	..	..	..	1	..	..	..	..	..	..	..	..
Paralysis	2	1	1	..	1	1	..	..	..	..	1	..	1
Mania	1	..	1	..	..	..	4	..	..	..	..	..	2
Amentia	1	..	..	..	1	..	5	1	..	..	..	..	1
Epilepsia	5	2	4	1	1	1	6	..	1	..	5	..	4
Cephalæa	11	..	1	..	10	..	3	..	3	..	1	..	..
Neuralgia	3	..	..	..	3	..	1	..	..	..	1	..	..
Otitis	..	..	..	..	..	..	1	..	..	..	1	..	..
Nyctalopia	..	..	..	..	..	..	..	..	..	..	1	..	..
2. Circulatory System:													
Hypertrophia Cordis	..	1	..	1	..	..	..	..	..	..	..	..	..
Morbus Valvæ Cordis	2	2	1	1	1	1	1	..	..	..	1	1	2
Endocarditis	..	..	..	..	..	..	..	..	..	..	..	..	1

| | | |

Abstract No. 17—*continued.*

Stations	Windward and Leeward Command.		Subordinate Stations.				Jamaica.		Honduras.		Bahamas.		Black Troops in West Indies and Africa.
			Barbadoes.		Demerara.								
Average Strength	603		437		156		722		363		392		3,095
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Discharged as Invalids.
7. Locomotive System:													
Arthritis	..	..	..	..	..	..	..	..	..	..	2	..	1
Synovitis	1	..	1	..	1	..	..	..	1	..	1	..	1
Caries	1	..	..	..	1	..	1	..	..	..	1	..	2
Necrosis	..	..	..	..	..	..	1	..	..	..	..	..	..
Integumentary System:													
Urticaria	1	..	..	..	2	..	..	..	..	..	..	..	..
Eczema	..	..	..	..	..	..	3	..	3	..	1	..	..
Herpes	2	..	..	..	..	..	1	..	..	..	..	..	..
Impetigo	..	..	..	..	..	..	..	..	2	..	..	..	..
Psoriasis	1	..	..	..	1	..	1	..	..	..	3	..	..
Phlegmon	11	..	7	..	4	..	20	..	4	..	6	..	..
Abscessus	9	..	5	..	4	..	13	..	4	..	2	..	1
Paronychia	..	..	..	..	..	..	4	..	2	..	2	..	..
Ulcus	22	..	15	..	7	..	31	..	27	..	44	..	1
IV. *Developmental Diseases.*													
4. Diseases of Nutrition:													
Atrophia	..	..	..	..	..	..	1	..	6	..	..	..	1

V. *Violent Deaths or Diseases.*																		
1. Accidental:																		
Ambustio	2	..	1	..	1	..		..	..	..	2	..	..
Insolatio	..	..	..	..	..	..	..	..	1	1	..	..	..
Submersio	..	..	..	..	..	..	..	..	..	1	..	..	..
Fractura	..	..	..	..	..	..	1	..	..	..	2	..	..
Amputatio	..	..	..	..	..	..	1	..	..	..	..	..	..
Contusio	11	..	1	..	10	..	17	..	6	1	21	..	..
Vulnus Sclopetarium	1	..	..	..	1	..	1	..	..	..	1	..	2
„ Incisum	24	..	16	..	8	..	25	..	6	..	10	..	..
Subluxatio	5	..	4	..	1	..	6	..	..	..	1	..	..
Vesiculæ Pedis	1	..	1	..	..	..	3	..	..	..	..	..	..
Morsus Hominis	..	..	..	..	..	..	1	..	..	..	..	..	..
2. In Battle:																		
Vulnus Sclopetarium	..	..	..	..	..	..	..	..	3	1	..	..	..
4. Suicidal:																		
Vulnus Sclopetarium	..	..	..	..	..	..	..	1	..	..	..	..	..
6. Punitus	2	..	1	..	1	..	..	..	..	..	1	..	..
Total	629	23	400	18	229	10	948	21	323	8	473	9	69

APPENDIX No. XXI—*continued.*

ABSTRACT No. 18, showing the Admissions into Hospital and Deaths among the Black Troops serving in Western Africa, during the Year 1867.

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	508		189		238		80	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic:								
Variola	8	3	3	..	..	..	..	..
Tonsillitis	5	..	1	..	2	..	..	..
Influenza	..	..	..	..	1	..	..	..
Ophthalmia	6	..	1	..	2	..	1	..
Erysipelas	1	..	..	..	..	..	..	..
Furunculus	2	..	..	..	3	..	2	..
Anthrax	..	..	..	..	..	..	1	..
Dysenteria Acuta	5	..	1	1	33	3	10	..
„ Chronica	..	..	..	..	2	..	..	..
Diarrhœa	10	..	6	..	8	..	38	1
Febris Intermittens	7	..	15	..	8	..	60	..
„ Remittens	157	..	..	..	85	1	29	1
„ Typhoides	..	..	..	..	1	1	..	..
Rheumatismus Acutus	25	1	5	..	6	..	6	..
„ Chronicus	11	1	28	..	7	..	5	..
Coryza	1	..	..	..	..	..	..	..
2. Enthetic:								
Syphilis Primaria	42	..	17	..	4	..	17	..
„ Secundaria	6	..	..	..	14	..	1	..
Bubo	26	..	4	..	1	..	4	..
Gonorrhœa	109	..	45	..	37	..	11	..
Phymosis, &c.	1	..	1	..	..	..	..	..
Orchitis (Gonorrhœal)	4	..	3	..	4	..	..	..
Strictura Urethræ	..	..	..	..	..	..	1	..
2. Dietic Diseases:—								
Scorbutus	..	..	..	..	1	..	..	..
4. Parasitic:								
Scabies	8	..	3	..	1	..	3	..
Dracunculus	..	..	..	..	1	..	..	..
II. *Constitutional Diseases.*								
1. Diathetic:								
Lumbago	2	..	..	..	4	..	..	..
Ischias	..	..	..	..	..	..	1	..
Anasarca	..	..	2	1	..	..	..	..
2. Tubercular:								
Scrofula	1	1	..	..	..	..	..	..
Phthisis Pulmonalis	9	7	4	2	4	3	..	..
Hæmoptysis	1	1	1	1	2	..	1	1
III. *Local Diseases.*								
1. Nervous System:								
Mania	..	..	..	..	1	..	..	..
Epilepsia	..	..	..	..	2	..	1	..

Abstract No. 18—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	508		189		238		80	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Tetanus	..	..	1	1	..	..	..	..
Cephalæa	2	.	..	..	1	1	..	..
Neuralgia	1	..	..	..	1	..	2	..
Otitis	1	..	..	..	..	..	..	..
2. Circulatory System:								
Carditis	6	..	..	..	..	..	..	..
Pericarditis	1	..	..	..	..	..	..	..
Aneurisma	..	..	..	..	..	..	..	1
3. Respiratory System:								
Bronchitis Acuta	25	..	2	..	29	..	1	..
„ Chronica	8	..	2	..	2	..	..	..
Pleuritis	6	1	5	..	1	..	..	..
Pleurodynia	..	..	1	..	2	..	..	..
Pneumonia	5	1	5	3	2	1	..	..
4. Digestive System:								
Stomatitis	1	..	..	..	..	..	..	..
Pharyngitis	1	..	..	..	..	..	..	..
Enteritis	1	1	..	..	..	.	..	..
Obstipatio	4	..	..	..	..	..	1	..
Dyspepsia	3	..	6	..	..	..	..	..
Colica	6	..	..	..	5	..	..	..
Hernia	1	..	..	..	..	..	1	..
Hæmorrhois	1	..	..	..	..	..	..	..
Splenitis	1	..	..	..	..	..	2	..
Hepatitis Acuta	2	..	..	..	1	..	3	
„ Chronica	2	1	..	..	..	..	..	..
Ascites	3	1	..	..	..	..	..	..
5. Urinary System:								
Nephritis	..	..	..	..	4	1	1	..
Nephria	..	1	..	..	..	..	..	..
Hæmaturia	..	..	1	..	1	..	..	..
6. Reproductive System:								
Hydrocele	..	..	..	..	1	..	..	..
Orchitis (not Gonorrhœal)	2	..	3	..	2	..	1	..
7. Locomotive System:								
Arthritis	..	..	1	..	5	1	..	..
Periostitis	..	..	..	..	4	..	..	..
8. Integumentary System:								
Eczema	..	..	2	..	..	..	..	..
Herpes	2	..	2	..	..	..	..	..
Impetigo	1	..	..	..	..	..	..	..
Psoriasis	..	..	..	..	2	..	..	..

Abstract No. 18—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast.		Lagos.	
Strength	508		189		238		80	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Ecthyma	1	..	..	..	..	..	..	..
Phlegmon	3	..	3	..	2	..	4	..
Abscessus	10	..	6	..	10	..	3	..
Paronychia	6	..	..	..	3	..	1	..
Ulcus	59	..	10	..	25	..	6	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Fractura	2	..	..	..	..	..	..	..
Ruptura Ilei	1	1	..	..	..	..	..	..
Contusio	8	..	2	..	18	..	2	..
Vulnus Incisum	7	..	4	..	12	..	3	..
Subluxatio	4	..	1	..	2	..	1	..
Vesiculæ Pedis	..	..	..	..	1	..	..	..
Total	634	21	197	9	370	12	224	4

APPENDIX No. XXI—*continued.*

ABSTRACT No. 19, showing the Ages of the Troops serving in West Indies and Africa, and the Deaths at each Age, during the year 1867.

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
WHITE TROOPS.														
Royal Artillery	5	..	31	..	92	5	57	1	6	..	1	1	192	7
2nd Batt. 16th Foot	38	..	157	..	398	3	87	1	28	2	4	..	712	6
Total	43	..	188	..	490	8	144	2	34	2	5	1	904	13
BLACK TROOPS.														
Additional Artillery	..	..	23	..	20	1	4	1	6	..	2	..	55	2
1st West India Regiment	119	..	184	14	137	3	44	2	46	1	5	1	535	21
2nd „ „	109	3	215	6	223	7	47	6	24	2	..	1	618	25
3rd „ „	286	..	127	7	138	10	113	1	91	2	85	..	840	20
4th „ „	194	1	280	9	110	13	71	3	22	..	..	..	677	26
Military Labourers	8	..	35	1	63	..	27	1	32	..	18	..	183	2
Total	716	4	864	37	691	34	306	14	221	5	110	2	2,908	96

APPENDIX No. XXI—*continued.*

ABSTRACT No. 20, showing the Admissions into Hospital and Deaths among the Troops serving at St. Helena, the Cape of Good Hope, Mauritius and Ceylon, in the year 1867.

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon.			
							White.		Black.	
Strength	381		4,25[illegible]		1,294		919		974	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic Diseases:										
Varioloides	..	..	1	..	..	..	..	..	..	..
Varicella	..	..	..	..	..	..	..	..	1	..
Morbilli	..	..	..	..	..	..	..	..	8	..
Tonsillitis	4	..	110	..	14	..	8	..	2	..
Influenza	10	..	13	..	4	..	3	..	..	..
Ophthalmia	13	..	372	..	23	..	44	..	42	..
Erysipelas	1	..	24	..	1	..	..	..	1	..
Furunculus	4	..	25	..	2	..	3	..	25	..
Anthrax	..	..	2	..	1	..	1	..	..	..
Dysenteria Acuta	2	..	15	2	118	11	42	..	12	2
„ Chronica	4	..	7	..	1	1	10	1	..	..
Diarrhœa	3	..	107	3	41	..	38	1	31	2
Cholera Spasmodica	..	..	..	..	..	..	1	1	..	..
Febris Intermittens	..	..	87	..	504	1	13	..	302	..
„ Remittens	..	..	5	1	1465	21	29	..	20	..
„ Typhoides	..	..	7	..	9	4	..	..	..	..
„ Typhus	..	..	1	1	..	..	..	..	..	..
„ Continua	11	..	249	3	204	1	68	..	..	..
Rheumatismus Acutus	2	..	163	1	11	..	15	..	25	..
„ Chronicus	13	..	130	..	4	..	6	..	37	..
Parotitis	..	..	3	..	..	..	2	..	3	..
2. Enthetic Diseases:										
Syphilis Primaria	26	..	555	..	68	..	67	..	2	..
„ Secundaria	4	..	294	..	12	..	13	..	1	..
Iritis Syphilitica	..	..	3	..	3	..	..	..	..	..
Ulcus Penis	..	..	..	..	2	..	..	..	..	..
Bubo	6	..	220	..	17	..	28	..	9	..
Gonorrhœa	36	..	745	..	52	..	56	..	8	..
Phymosis, &c.	..	..	7	..	3	..	3	..	..	..
Orchitis (Gonorrhœal)	..	..	30	..	..	..	5	..	2	..
Rheumatismus (Gonorrhœal)	..	..	1	..	..	..	..	..	1	..
Strictura Urethræ	..	..	10	..	1	..	2	..	1	..
Verrucæ	..	..	..	..	1	..	1	..	..	..
3. Dietic Diseases:										
Scorbutus	..	..	2	..	1	..	..	..	..	..
Ebriositas	15	..	82	1	70	1	57	..	3	1

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic Diseases:										
Aphthæ	..	..	1	..	..	..	..	..	..	..
Porrigo	..	..	6	..	..	..	..	..	..	..
Scabies	9	..	26	..	..	..	..	..	40	..
Tænia Solium	..	..	11	..	1	..	4	..	..	..
Vermes	..	..	2	..	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Lumbago	..	..	9	..	1	..	..	..	..	..
Anæmia	..	..	5	..	1	..	6	..	1	..
Anasarca	..	..	5	..	..	..	2	..	6	1
Tumores	..	..	1	..	2	..	2	..	..	..
Carcinoma	..	..	..	..	..	..	..	..	1	..
2. Tubercular Diseases:										
Scrofula	..	..	10	..	..	..	2	..	..	..
Phthisis Pulmonalis ..	..	..	43	4	6	1	11	1	3	1
Hæmoptysis	..	..	3	..	2	..	8	..	..	..
III. *Local Diseases.*										
1. Nervous System:										
Encephalitis	..	..	..	..	..	..	1	1	..	..
Apoplexia	..	..	..	4	..	..	..	..	1	..
Paralysis	..	..	12	..	..	..	1	..	..	..
Delirium Tremens	1	..	15	2	6	..	5	..	1	..
Mania	..	..	7	..	..	..	1	..	1	..
Amentia	1	..	13	..	..	..	..	..	2	..
Epilepsia	..	..	19	..	..	..	..	..	..	..
Convulsio	2	..	..	..	..	..	..	..	..	..
Cephalæa	12	..	25	..	4	..	1	..	..	..
Neuralgia	..	..	4	..	1	..	3	..	..	..
Dysecœa	..	..	3	..	..	..	2	..	..	..
Otitis	..	..	8	..	5	..	5	..	1	..
Glaucoma	1	..	..	..	..	..	..	..	..	..
Cæcitas	..	..	1	..	..	..	..	..	..	..
Iritis	..	..	1	..	..	..	..	..	..	..
Myopia	..	..	..	..	1	..	..	..	..	..
2. Circulatory:										
Pericarditis	..	..	2	..	..	..	..	..	..	..
Hypertrophia Cordis ..	..	..	15	..	..	..	14	..	..	..
Morbus Valv: „ ..	5	1	18	4	2	1	3	1	..	..
Palpitatio	2	..	5	..	1	..	..	..	..	..
Aneurisma Aortæ	..	..	2	1	..	..	..	..	..	..
„	..	..	..	..	..	..	1	..	..	..
Varix	1	..	..	..	..	..	5	..	..	..
Phlebitis	..	..	..	..	..	..	1	..	..	..

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritiu.		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
3. Respiratory System:										
Laryngitis	..	..	1	..	..	..	..	..	..	..
Bronchitis Acuta	..	..	130	2	18	..	21	..	56	..
„ Chronica	..	..	25	1	5	..	13	..	9	..
Pleuritis	1	..	7	..	2	..	1	..	1	..
Pneumonia	1	1	29	3	..	..	1	..	1	..
Apoplexia Pulmonalis	..	..	2	..	..	..	..	..	..	..
Asthma	..	..	5	..	1	..	..	..	17	..
Emphysema	..	..	..	..	1	..	..	..	..	..
Epistaxis	..	..	2	..	..	..	1	..	..	..
4. Digestive System:										
Pharyngitis	..	..	1	..	..	..	..	..	..	..
Stomatitis	..	..	..	..	..	..	..	..	1	..
Gastritis	..	..	2	..	..	..	2	..	..	..
Enteritis	..	..	1	..	..	..	..	..	..	..
Obstipatio	..	..	2	..	..	..	2	..	2	..
Dyspepsia	1	..	129	..	14	..	26	..	5	..
Colica	1	..	7	..	4	..	1	..	18	1
Hæmatemesis	..	..	8	..	1	..	..	..	..	..
Hernia	..	..	10	..	..	..	..	..	1	..
Hæmorrhois	4	..	25	..	3	..	6	..	1	..
Fistula in ano	..	..	5	..	3	..	..	..	..	..
Splenitis	..	..	4	..	..	..	4	..	..	..
Hepatitis Acuta	..	..	15	1	18	1	25	2	1	..
„ Chronica	..	..	13	1	7	2	14	1	..	..
Icterus	..	..	6	..	1	..	5	..	1	..
Ascites	..	..	1	..	..	.	1	..	1	1
5. Urinary System:										
Nephritis	..	..	4	..	1	..	..	..	..	..
Nephria	..	..	4	..	..	..	..	..	1	..
Ischuria	..	..	..	..	..	..	1	..	..	..
Hæmaturia	..	..	..	..	1	..	1	..	..	..
Cystitis	..	..	2	..	..	..	1	..	..	..
Fistula in Perineo	..	..	3	..	..	..	..	..	..	..
Enuresis	..	..	2	..	..	..	2	..	..	..
Diuresis	..	..	2	..	..	..	..	..	..	..
Diabetes	..	..	1	..	..	..	..	..	..	..
6. Reproductive System:										
Varicocele	..	..	..	..	..	..	2	..	1	..
Hydrocele	..	..	10	..	..	..	..	..	1	..
Orchitis (not Gonorrhœal)	4	..	75	..	3	..	13	..	3	..
7. Locomotive System:										
Arthritis	..	..	2	..	..	..	2	..	..	..
Synovitis	2	..	9	..	..	..	..	..	..	..
Contractura	1	..	1	..	..	..	..	..	..	..
Periostitis	..	..	10	..	2	..	1	..	..	..
Exostosis	..	..	1	..	..	..	..	..	..	..
Caries	..	..	1	..	..	..	..	..	..	..
Necrosis	..	..	1	..	..	..	..	..	..	..
Hydrarthrus	..	..	1	..	..	..	..	..	..	..

Abstract No. 20—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius.		Ceylon. White.		Ceylon. Black.	
Strength	381		4,255		1,294		919		974	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
8. Integumentary System:										
Eczema	1	..	19	..	4	..	..	..	4	..
Herpes	1	..	4	..	1	..	2	..	1	..
Impetigo	..	..	5	..	..	..	2	..	..	..
Psoriasis	..	..	7	..	2	..	..	..	2	..
Rupia	..	..	1	..	..	..	..	..	..	..
Pemphigus	..	..	..	..	..	..	..	..	1	..
Pityriasis	..	..	..	..	..	..	1	..	..	..
Acne	..	..	..	..	..	..	2	..	..	..
Phlegmon	2	..	200	..	10	..	8	..	17	..
Abscessus	1	..	86	..	17	..	41	..	24	..
Paronychia	..	..	13	..	1	..	3	..	2	..
Ulcus	8	..	275	..	23	..	65	..	61	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	1	..	22	..	9	..	9	..	1	1
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	..	..	21	..	4	..	..	..	2	..
Insolatio	..	..	..	..	..	..	1	..	1	..
Submersio	..	..	..	2	..	..	..	1	..	..
Fractura	1	..	27	1	2	..	8	1	3	..
Suffocatio	..	..	..	2	..	..	..	..	..	..
Contusio	4	..	291	..	23	..	58	..	29	..
Commotio	..	..	4	1	..	..	1	..	..	..
Vulnus Sclopetarium	..	..	7	..	..	..	..	..	..	..
„ Incisum	6	..	77	..	16	..	25	..	21	..
Luxatura	..	..	8	..	3	..	..	..	2	..
Subluxatio	3	..	88	..	17	..	18	..	9	..
Vesiculæ Pedis	..	..	16	..	..	..	16	..	3	..
Morsus Canis	..	..	..	..	..	..	..	..	1	..
4. Suicidal:										
Vulnus Incisum	1	..	..	..	1	..	..	..	..	..
„ Sclopetarium	..	..	..	1	..	1	..	..	..	..
6. Punitus	1	..	8	..	5	..	..	..	..	..
No appreciable disease	..	..	..	..	1	..	1	..	..	..
Unknown	..	..	..	..	..	..	..	..	..	1
Total	233	2	5,280	42	2,889	46	1,000	11	898	11

Abstract No. 20—*continued.*

Causes of the Deaths of the Invalids.

	St. Helena.	Cape.	Mauritius.	Ceylon. White.
Dysenteria	..	..	1	..
Diarrhœa	..	1	..	..
Syphilis Secundaria ..	..	2	..	..
Phthisis Pulmonalis ..	..	3	4	1
Asthenia	..	..	1	1
Insolatio	..	1	..	..
Submersio (suicidal) ..	..	..	1	..
Total	..	7	7	2

APPENDIX No. XXI—*continued.*

ABSTRACT No. 21, showing the Number of Men sent home from St. Helena, the Cape of Good Hope, Mauritius, and Ceylon, in 1867, as Invalids, and of Invalids finally discharged the Service in these Colonies and in England.

Diseases.	St. Helena.		Cape.			Mauritius.		Ceylon.		
								White.		Black.
	Sent Home.	Discharged at Netley.	Sent Home.	Discharged in the Colony.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Discharged in the Colony.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Tonsillitis	..	..	2	..	..	..	..	..	..	..
Ophthalmia	..	1	6	..	4	3	3	..	1	5
Dysenteria	..	..	2	..	..	1	..	1	1	..
Diarrhœa	..	..	5	..	..	..	..	..	..	..
Febris Intermittens	..	..	..	..	..	..	2	..	..	..
„ Remittens	..	..	2	..	..	120	..	..	..	..
Rheumatismus Chronicus	3	1	10	1	5	1	..	..	1	10
2. Enthetic:										
Syphilis Primaria	..	..	..	..	..	..	..	1	..	..
„ Secundaria	..	..	8	..	7	..	1	1	..	..
Bubo	..	..	..	..	1	..	..	..	..	..
Orchitis (Gonorrhœal)	..	..	1	..	..	..	..	..	..	..
Strictura Urethræ	..	..	..	..	1	..	..	..	..	..
3. Dietic:										
Scorbutus	..	..	..	..	..	..	..	..	1	..
II. *Constitutional Diseases.*										
1. Diathetic:										
Anæmia	..	..	1	..	..	..	..	..	1	1
2. Tubercular	..	..								
Scrofula	..	..	3	..	..	..	..	..	..	..
Phthisis Pulmonalis	..	2	20	..	16	6	5	5	3	..
Hæmoptysis	..	..	..	..	..	..	..	..	1	..
III. *Local Diseases.*										
1. Nervous System:										
Paralysis	..	..	3	1	2	..	..	..	..	1
Mania	..	..	3	..	..	..	..	1	..	..
Amentia	1	..	3	..	..	..	..	..	..	1
Epilepsia	..	..	4	..	2	..	..	..	..	..
Dysecœa	..	..	..	..	..	..	..	1	..	..
Otitis	..	..	..	..	..	..	..	..	1	..
Cephalæa	1	..	..	..	1	..	..	..	..	..
Glaucoma	1	..	..	..	..	..	..	..	..	..
Cæcitas	..	..	1	..	2	..	1	..	2	..
Myopia	..	..	1	..	..	1	..	..	..	.
2. Circulatory System:										
Hypertrophia Cordis	..	2	7	..	2	..	1	..	..	..
Morbus Valv: „	3	..	5	1	6	1	1	..	..	..
Palpitatio	1	..	.	..	..	..	..	..	..	..

Abstract No. 21—*continued.*

Diseases.	St. Helena.		Cape.			Mauritius.		Ceylon.		
								White.		Black.
	Sent Home.	Discharged at Netley.	Sent Home.	Discharged in the Colony.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Discharged in the Colony.
Aneurisma Aortæ ..	..	..	1	..	..	..	..	..	..	..
Aneurisma	..	..	..	..	1	..	..	..	..	..
Varix	2	1	..	..	2	..	..	..	..	..
3. Respiratory System:										
Bronchitis Chronica ..	..	..	1	..	1	1	2	2	2	..
Pleuritis	..	..	..	..	..	..	..	..	..	1
Asthma	..	..	4	..	..	..	..	..	..	..
Emphysema	..	..	..	..	1	..	..	..	1	..
4. Digestive System:										
Hernia	2	1	1	..	2	..	..	..	..	..
Fistula in Ano	..	..	1	..	..	..	..	..	..	..
Hepatitis Acuta	..	..	2	..	..	..	1	..	..	..
„ Chronica ..	..	..	..	..	..	2	..	2	..	..
Ascites	..	..	..	..	1	..	..	..	..	..
5. Urinary System:										
Nephritis	..	..	1	..	..	..	..	..	..	..
Nephria	..	..	..	..	1	..	..	..	..	1
Cystitis	..	..	..	..	..	..	..	1	..	..
6. Reproductive Syst.:										
Varicocele..	..	..	1	..	..	..	..	..	..	..
Orchitis (not Gonorrhœal)	1	..	..	..	1	..	..	..	..	..
7. Locomotive System:										
Arthritis	..	..	1	..	..	..	..	1	..	..
Synovitis	1	..	..	..	..	..	..	..	..	..
Contractura	1	1	..	..	2	..	..	..	1	..
Periostitis..	..	..	1	..	..	..	..	..	..	..
Necrosis	..	..	..	..	1	..	..	..	..	..
8. Integumentary Syst.:										
Abscessus	..	..	..	..	..	..	1	..	..	..
Ulcus	3	..	1	..	1	1	..	..	..	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	..	2	..	4	2	..	6	..	5
Worn out..	..	..	..	..	..	..	..	1	..	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Submersio..	..	..	1	..	..	..	..	..	..	..
Fractura	..	..	1	..	1	..	..	..	..	..
Amputatio	..	..	1	..	2	..	..	..	..	..
Commotio	..	..	..	..	..	..	..	1	..	..
Luxatura	..	..	..	..	..	1	2	..	..	..
Subluxatio	..	..	1	..	1	..	..	..	..	..
4. Suicidal:										
Vulnus Incisum	1	..	..	..	..	..	..	..	..	..
„ Sclopetarium ..	..	..	1	..	..	..	..	..	..	..
Total	23	9	109	3	71	140	20	24	16	25

APPENDIX No. XXI—*continued.*

ABSTRACT No. 22, showing the Ages of the Troops serving at the Cape of Good Hope, and the Deaths at each Age, during the Year 1867.

Age	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	2	..	11	..	54	2	51	..	27	..	4	..	149	2
„ Engineers ..	4	..	32	..	65	..	63	2	28	..	7	..	199	2
1st Bn. 9th Foot ..	48	..	146	2	323	6	162	5	54	..	14	1	747	14
1st „ 10th „ ..	71	..	324	2	201	2	84	3	53	3	8	..	741	10
2nd „ 11th „ ..	46	..	128	..	219	5	163	1	71	..	2	..	629	6
99th Foot	14	..	65	..	357	3	146	1	35	1	7	..	624	5
Cape Mounted Rifles	241	..	140	..	23	3	26	1	27	1	7	1	464	6
Total	426	..	846	4	1,242	21	695	13	295	5	49	2	3,553	45

APPENDIX No. XXI—*continued.*

ABSTRACT No. 23, showing the Ages of the Troops serving in Ceylon, and the Deaths at each Age, during the Year 1867.

Corps.		Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
		Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.	Strength on 1st Jan.	Died.
White	Artillery	3	..	16	..	26	..	23	1	15	..	..	..	83	1
	2nd Battalion 25th Foot.	182	1	299	4	242	3	38	3	6	..	2	..	769	11
	Total	185	1	315	4	268	3	61	4	21	..	2	..	852	12
Black	Gun Lascars	2	..	26	2	29	..	28	..	39	..	33	..	157	2
	Ceylon Rifles	100	..	190	..	100	..	139	2	128	6	134	1	791	9
	Total	102	..	216	2	129	..	167	2	167	6	167	1	948	11

APPENDIX No. XXI—*continued.*

ABSTRACT No. 24, showing the Admissions into Hospital and Deaths among the Troops serving in Australia, New Zealand, China, and Japan, during the year 1867.

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	1,729		1,760		723		425		773	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Variola	..	..	..	..	1	..	43	2	23	..
Varioloides	..	..	..	..	..	..	3	..	..	..
Varicella	..	..	..	..	..	..	10	..	..	..
Morbilli	4	1	1	..	..	..	..	..	..	..
Tonsillitis	20	..	22	..	11	..	2	..	6	..
Influenza	16	..	22	..	1	..	..	..	..	..
Ophthalmia	77	..	55	..	13	..	3	..	51	..
Erysipelas	2	..	3	..	..	..	3	..	..	..
Furunculus	4	..	25	..	21	..	14	..	12	..
Anthrax	1	..	1	..	..	..	1	..	..	..
Dysenteria Acuta	3	..	4	..	45	2	29	2	1	..
Diarrhœa	29	..	35	..	119	..	34	1	8	..
Cholera Spasmodica	..	..	..	..	1	1	..	..	..	..
Febris Intermittens	6	..	1	..	149	..	143	..	26	..
„ Remittens	6	..	..	..	118	5	2	..	2	..
„ Typhoides	1	..	1	..	2	..	..	..	1	..
„ Continua	20	..	31	..	99	1	29	..	25	..
Rheumat: Acutus	22	..	29	..	9	..	59	..	7	..
„ Chronicus	17	..	16	..	9	..	20	..	88	..
Parotitis	3	..	..	..	..	..	..	..	3	..
Diphtheria	2	..	..	..	..	..	..	..	..	..
2. Enthetic:										
Syphilis Primaria	82	..	12	..	21	..	18	..	341	..
„ Secundaria	22	..	16	..	22	..	2	..	60	..
Iritis Syphilitica	..	..	..	..	2	..	..	..	9	..
Bubo	18	..	3	..	4	..	4	..	56	..
Gonorrhœa	312	..	59	..	31	..	19	..	117	..
Phymosis, &c.	1	..	..	..	2	..	..	..	1	..
Orchitis (Gonorr:)	12	..	2	..	4	..	4	..	29	..
Strictura Urethræ	5	..	4	..	..	..	1	..	3	..
3. Dietic:										
Ebriositas	74	..	28	..	22	..	..	..	14	1
4. Parasitic:										
Porrigo	1	..	..	..	..	..	..	..	..	..
Scabies	13	..	11	..	..	..	12	..	14	..
Tænia Solium	..	..	..	..	2	..	..	..	..	..
Ascaris Lumbricoides	..	..	..	..	..	..	1	..	..	..
Vermes	..	..	..	..	..	..	1	..	..	..

Abstract No. 24—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	1,729		1,760		723		425		773	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*										
1. Diathetic:										
Podagra	..	..	..	..	..	..	1	..	..	..
Lumbago	2	..	14	..	3	..	2	..	5	..
Ischias	..	..	2	..	2	..	..	..	..	..
Anæmia	..	..	1	..	6	..	3	1	..	..
Anasarca	..	..	1	..	..	..	20	9	2	..
Beri Beri	..	..	..	..	..	..	2	1	..	..
Tumores	..	..	1	..	..	..	..	..	..	..
2. Tubercular:										
Scrofula	..	..	2	..	2	..	1	..	..	..
Phthisis Pulmonalis	20	7	11	4	20	1	1	1	3	..
Hæmoptysis	1	..	3	..	3	..	..	..	..	..
III. *Local Diseases.*										
1. Nervous Syst.:										
Apoplexia	..	..	..	..	..	..	..	..	1	1
Paralysis	..	..	2	..	3	..	1	..	1	1
Delirium Tremens	9	..	1	..	7	..	..	..	2	..
Mania	2	..	..	..	1	..	..	..	..	..
Amentia	7	..	..	..	1	..	..	..	1	..
Epilepsia	..	..	1	..	6	..	1	..	..	..
Cephalæa	4	..	14	..	7	..	1	..	7	..
Tumor Cerebri	..	..	1	1	..	..	..	..	..	..
Neuralgia	..	..	9	..	2	..	..	..	..	..
Odontalgia	..	..	1	..	..	..	..	..	..	..
Dysecœa	..	..	1	..	..	..	..	..	..	..
Otitis	3	..	15	..	6	..	..	..	2	..
2. Circulatory Syst.:										
Hypertrophia Cordis	1	..	6	..	..	..	1	1	..	..
Degeneratio „	..	..	..	..	..	..	1	1	..	..
Morbus Valv: „	5	..	9	..	4	..	..	..	1	..
Angina Pectoris	..	..	1	..	..	..	..	..	..	..
Palpitatio	..	..	..	..	2	..	..	..	..	..
Aneurisma Aortæ	1	..	4	..	..	..	..	..	..	..
Aneurisma	1	3	1	..	1	..	..	..	..	..
Varix	..	..	1	..	2	..	..	..	..	..
3. Respiratory Syst.:										
Laryngitis	..	..	1	..	3	..	..	..	..	..
Bronchitis Acuta	79	..	54	..	9	..	27	1	5	..
„ Chronica	21	..	6	..	..	..	7	..	4	..
Pleuritis	10	..	1	..	13	..	..	..	..	..
Pleurodynia	..	..	2	..	..	..	..	..	..	..
Pneumonia	2	..	4	..	1	..	11	1	6	1
Asthma	..	..	3	..	..	..	6	..	..	..
Epistaxis	..	..	..	..	..	..	..	..	1	..

Abstract No. 24—*continued.*

Stations	Australia.		New Zealand.		China. White.		China. Black.		Japan.	
Strength	1,729		1,760		723		425		773	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Digestive Syst.:										
Gastritis	1	..	..	..	..	..	..	..	..	..
Obstipatio	..	..	3	..	7	..	..	..	..	..
Dyspepsia	22	..	26	..	8	..	..	..	1	..
Colica	15	..	7	..	7	..	2	..	2	..
Hæmatemesis	..	..	1	..	1	..	..	..	1	1
Hernia	2	..	2	..	..	..	1	..	1	..
Hæmorrhois	10	..	2	..	2	..	2	..	2	..
Fistula in Ano	1	..	2	..	1	..	1	..	..	..
Splenitis	..	..	1	..	5	..	3	..	3	..
Hepatitis Acuta	2	..	2	..	11	..	5	..	2	1
„ Chronica	1	1	6	..	2	..	3	..	5	..
Icterus	2	..	11	1	..	..	..	..	1	..
Ascites	..	..	1	..	..	..	..	..	..	..
Prolapsus Ani	..	..	..	..	..	..	1	..	..	..
5. Urinary Syst.:										
Nephritis	1	..	..	..	..	..	..	..	..	..
Nephria	..	..	..	..	..	..	3	..	..	..
Ischuria	..	..	1	..	..	..	..	..	..	..
Hæmaturia	..	..	..	..	1	..	..	..	..	..
Cystitis	..	..	2	..	..	..	1	..	1	..
Fistula in Perineo	..	..	..	..	..	..	..	..	1	..
Enuresis	..	..	3	..	..	..	..	..	..	..
Prostatitis	..	..	1	..	..	..	..	..	..	..
Diabetes	..	..	..	..	..	..	..	..	2	1
6. Reproductive System:										
Hydrocele	1	..	..	..	2	..	..	..	2	..
Orchitis (not Gon:)	12	..	10	..	5	..	10	..	12	..
Spermatorrhœa	..	..	2	..	..	..	..	..	..	..
7. Locomotive Syst:										
Arthritis	..	..	..	..	1	..	..	..	1	..
Synovitis	3	..	..	..	2	..	..	..	3	..
Hydrarthrus	..	..	4	..	1	..	..	..	..	..
Contractura	..	..	..	..	2	..	..	..	..	..
Periostitis	..	..	2	..	4	..	..	..	1	..
Necrosis	..	..	1	..	..	..	..	..	..	..
8. Integumentary System:										
Urticaria	3	..	..	..	2	..	..	..	..	..
Eczema	1	..	6	..	3	..	2	..	4	..
Herpes	2	..	4	..	1	..	..	..	2	..
Impetigo	..	..	2	..	1	..	..	..	..	..
Psoriasis	..	..	9	..	..	..	..	..	..	..
Lichen	..	..	1	..	..	..	..	..	..	..
Prurigo	2	..	..	..	..	..	..	..	..	..
Mentagra	..	..	1	..	..	..	..	..	..	..

Abstract No. 24—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	1,729		1,760		723		425		773	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Pityriasis	..	..	3	..	..	..	..	..	..	..
Lepra	..	..	2	..	..	..	..	..	..	..
Ecthyma	..	..	..	..	4	..	..	..	..	..
Phlegmon	46	..	55	..	13	..	3	..	6	..
Abscessus	10	..	11	..	5	..	24	..	14	..
Paronychia	6	..	10	..	5	..	2	..	2	..
Ulcus	33	..	36	..	13	..	21	..	35	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	..	..	..	4	..	6	4	4	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	3	..	4	..	..	..	..	..	4	..
Submersio	..	1	..	2	..	1	..	..	..	1
Fractura	6	..	9	..	8	..	..	..	6	..
Amputatio	1	..	..	..	..	..	..	..	..	..
Contusio	77	..	83	..	40	..	11	..	29	..
Commotio	..	..	..	..	..	..	1	1	..	..
Vulnus Sclopetarium	1	..	..	..	..	..	..	..	..	..
„ Incisum	19	..	34	..	32	..	2	..	26	..
Luxatura	2	..	2	..	2	..	..	..	2	..
Subluxatio	47	..	44	..	17	..	3	..	16	..
Vesiculæ Pedis	1	..	11	..	6	..	1	..	1	..
Morsus Canis	..	..	1	..	..	..	..	..	1	..
„ Hominis	..	..	1	..	..	..	..	..	..	..
3. Homicidal:										
Vulnus Incisum	..	..	..	..	..	..	..	..	..	1
6. Punitus	9	..	9	..	..	..	..	..	4	..
No appreciable disease	1	..	..	..	..	..	..	..	..	..
Total	1,284	13	982	8	1,030	11	651	26	1,135	9

Causes of the Deaths of the Invalids.

	Australia.	New Zealand.	China.
Dysenteria	..	..	1
Total	..	..	1

APPENDIX No. XXI—*continued.*

ABSTRACT No. 25, showing the Number of Men sent home from Australasia and China, in 1867, as Invalids, and the Number discharged the Service as Invalids in Australasia and in England.

Stations	Australia and New Zealand.			China.		
				White.		Black.
Average Strength	3,489			1,496		425
Diseases.	Sent Home as Invalids.	Discharged the Service— In Colony.	Discharged the Service— In England.	Sent Home as Invalids.	Discharged in England.	Sent to Ceylon.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Ophthalmia	5	..	4	2	2	..
Dysenteria	..	..	1	..	1	1
Diarrhœa	..	..	..	..	1	..
Febris Intermittens	..	..	..	6	..	..
Rheumatismus Chronicus	1	..	2	3	..	7
2. Enthetic:						
Syphilis Secundaria	..	..	..	7	1	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Podagra	..	..	1	..	..	..
Anæmia	..	..	..	1	..	..
Anasarca	..	..	..	..	..	3
2. Tubercular:						
Scrofula	..	..	..	..	..	1
Phthisis Pulmonalis	13	..	2	8	8	..
III. *Local Diseases.*						
1. Nervous Syst.:						
Encephalitis	..	..	1	..	..	..
Paralysis	..	..	1	1	1	..
Mania	1	..	..	..	..	..
Amentia	1	..	..	1	..	..
Epilepsia	..	..	..	1	..	..
2. Circulatory Syst.:						
Morbus Valv: Cordis	7	..	3	1	3	..
Varix	..	..	..	1	..	..
3. Respiratory Syst.:						
Bronchitis	5	..	2	1	..	1
Pleuritis	2	..	..	..	..	..
Pneumonia	..	..	1	..	..	..
Asthma	1	..	..	..	..	1

Abstract No. 25—*continued.*

Stations	Australia and New Zealand.			China.		
				White.		Black.
Average Strength	3,489			1,496		425
Diseases.	Sent Home as Invalids.	Discharged the Service—		Sent Home as Invalids.	Discharged in England.	Sent to Ceylon.
		In Colony.	In England.			
4. Digestive Syst.:						
Dyspepsia	..	..	2	..	..	..
Hernia	1	..	..	..	..	..
Fistula in Ano	1	..	..	1	1	..
Splenitis	..	..	..	3	..	..
Hepatitis Acuta	..	..	..	3	..	..
„ Chronica	2	1	2	2	2	..
Ascites	1	..	..	..	..	..
7. Locomotive Syst.:						
Arthritis	..	..	..	..	1	..
Synovitis	..	..	..	2	1	..
Contractura	1	..	..	1	1	..
Exostosis	..	..	1	..	..	..
8. Integumentary Syst.:						
Abscessus	..	..	..	..	..	1
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	1	..	1	..	..	5
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Vulnus Incisum	..	..	1	..	..	..
„ Sclopetarium	..	..	2	..	..	..
Fractura	5	..	1	..	..	..
Amputatio	1	..	..	..	..	..
Subluxatio	..	..	..	1	1	..
2. Battle:						
Vulnus Sclopetarium	..	..	1	..	..	..
Total	49	1	29	46	24	20

APPENDIX No. XXI—*continued.*

ABSTRACT No. 26, showing the Ages of the Troops serving in Australasia, and the Deaths at each Age, during the Year 1867.

Age	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Royal Artillery	..	..	5	..	116	..	68	2	16	..	1	..	206	2
2nd Bn. 14th Foot	17	..	125	..	275	4	430	2	98	..	..	..	945	6
„ 18th „	9	..	158	..	532	1	124	2	40	..	..	..	863	3
50th Foot	10	..	222	1	293	..	223	3	62	1	21	..	831	5
Total	36	..	510	1	1,216	5	845	9	216	1	22	..	2,845	16

APPENDIX No. XXI—*continued.*

ABSTRACT No. 27, showing the Admissions into Hospital and Deaths among Her Majesty's European Troops serving in Bengal, Madras, and Bombay, during the Year 1867.

Stations	Bengal.		Madras.		Bombay.	
Average Strength	34,237		10,793		11,866	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Variola	27	4	10	1	4	..
Varioloides	3	..	..	..	..	..
Varicella	1	..	..	..	..	..
Morbilli	12	..	4	..	4	..
Tonsillitis	453	1	118	..	190	1
Influenza	206	..	63	..	60	..
Coryza	..	..	10	..	..	..
Ophthalmia	1,097	..	272	..	486	..
Erysipelas	48	..	18	1	12	..
Furunculus	321	..	111	..	134	..
Anthrax	7	..	6	..	5	..
Pyæmia	1	1	..	..	..	..
Dysenteria Acuta ..	1,244	70	748	32	210	14
„ Chronica ..			350	6	70	4
Diarrhœa	3,273	33	822	2	808	7
Cholera Spasmodica	682	467	13	4	90	53
Febris Intermittens	12,425	29	2,011	1	3,627	6
„ Remittens	911	29	102	1	299	7
„ Typhoides	16	8	7	2	20	9
„ Typhus	..	..	2	2	..	..
„ Continua	2,647	23	790	6	382	13
Rheumatismus Acutus ..	2,029	2	170	1	192	..
„ Chronicus			362	..	360	..
Parotitis	17	..	6	..	2	..
Diphtheria	1	..	..	..	..	..
Cynanche Trachealis	1	..	..	..	..	..
Vaccinia	10	..	..	..	..	..
2. Enthetic:						
Syphilis Primaria	1,815	..	715	..	830	..
„ Secundaria	786	2	349	1	427	2
Cachexia Syphilidea	..	..	..	..	5	..
Iritis Syphilitica	32	..	10	..	5	..
Bubo	580	..	251	..	296	..
Gonorrhœa	2,979	..	757	..	821	..
Phymosis &c.	25	..	12	..	17	..
Orchitis [illegible]	148	..	49	..	48	..
Stricture Urethræ	121	1	34	..	38	..
Verrucæ	26	..	2	..	2	..
Ulcus Penis	..	..	12	..	..	..
3. [illegible]						
[illegible]	28	..	5	..	18	..
[illegible]	5	1	..	..	4	..
[illegible]	672	6	443	3	282	6

Abstract No. 27—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	34,237		10,793		11,866	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic:						
Aphthæ	5	..	..	..	..	..
Porrigo	9	..	1	..	3	..
Scabies	43	..	58	..	18	..
Tænia Solium	269	..	31	..	55	..
Ascaris Lumbricoides	5	..	..	..	..	..
Vermes	4	..	5	..	2	..
Dracunculus	..	..	63	..	5	..
Phthiriasis	..	..	..	..	1	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Podagra	7	..	4	..	..	..
Lumbago	119	..	25	..	50	..
Ischias	15	..	2	..	1	..
Anæmia	215	3	25	..	87	..
Anasarca	17	3	24	..	7	1
Tumores	17	1	7	..	5	..
Scirrhoma	2	1	..	..	..	..
Carcinoma	5	1	..	..	..	..
Lupus	1	..	3	..	1	..
2. Tubercular:						
Scrofula	57	1	27	..	10	..
Phthisis Pulmonalis	256	50	135	25	81	6
Hæmoptysis	60	1	12	..	10	..
Tuberculosis Mesenterica	2	1	..	..	..	..
Abscessus Psoanus	2	1	1	1	2	..
Morbus Coxarius	..	..	3	..	1	..
III. *Local Diseases.*						
1. Nervous System:						
Encephalitis	8	4	1	..	2	1
Abscessus Cerebri	1	1	..	..	..	..
Meningitis	1	1	2	..	2	1
Phrenitis	..	..	1	1	..	..
Apoplexia	13	16	13	8	3	4
Paralysis	64	4	20	2	35	2
Delirium Tremens	133	13	60	8	54	4
Mania	20	..	8	1	15	..
Amentia	45	..	19	..	25	..
Epilepsia	86	5	29	2	29	..
Convulsio	8	..	1	..	1	..
Tetanus	..	..	1	1	..	..
Rabies	1	1	..	..	..	..
Cephalæa	357	..	103	..	165	..
Neuralgia	172	..	29	..	24	..
Chorea	2	..	1	..	..	..
Hysteria	..	..	1	..	..	..
Dysecœa	26	..	9	..	8	..
Otitis	237	..	44	..	64	..
Odontalgia	4	..	2	..	4	..
Sclerotitis	1	..	..	..	1	..
Polypus Nasi	2	..	..	..	..	..
Cataractes	..	..	..	..	1	..
Iritis	..	..	2	..	1	..
Cæcitas	3	..	..	..	16	..

Abstract No. 27—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	34,237		10,793		11,866	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Myopia	1	..	..	..	..	..
Hemeralopia	2	..	..	..	..	..
Amaurosis	..	..	..	..	5	..
Ozæna	..	..	1	..	..	..
2. Circulatory System:						
Carditis	14	1	62	..	20	1
Pericarditis	11	1	1	..	6	..
Hypertrophia Cordis	127	1	11	..	16	..
Atrophia „	8	..	..	..	4	..
Degeneratio „	10	..	2	1	..	..
Morbus Valv: „	145	16	68	8	55	8
Angina Pectoris	15	..	7	..	4	..
Aneurisma Aortæ	27	17	10	5	9	4
Aneurisma	..	3	3	1	1	..
Varix	19	..	11	..	11	..
Syncope	10	..	..	..	..	..
Palpitatio	47	..	22	..	..	..
Phlebitis	2	..	..	..	..	..
Arteritis	1	..	..	..	1	..
3. Respiratory System:						
Laryngitis	8	..	2	1	2	..
Œdema Glottidis	2	..	1	1	..	..
Bronchitis Acuta	1,338	9	281	..	266	..
„ Chronica			153	..	197	1
Pleuritis	148	4	26	..	39	..
Pleurodynia	41	..	..	..	..	..
Empyema	1	1	..	..	..	..
Hydrothorax	..	..	..	..	1	1
Pneumonia	139	24	18	3	23	3
Apoplexia Pulmonalis	..	2	1	1	..	..
Asthma	14	1	10	..	2	..
Emphysema	1	..	1	..	2	..
Epistaxis	21	..	2	..	2	..
4. Digestive System:						
Stomatitis	11	..	..	..	3	..
Pharyngitis	11	..	2	..	..	..
Glossitis	2	..	1	..	..	..
Gastritis	24	5	6	..	4	..
Enteritis	6	2	4	1	2	2
Peritonitis	19	7	1	..	8	4
Obstipatio	98	..	36	..	16	..
Dyspepsia	1,145	..	597	..	469	..
Colica	373	..	82	..	114	..
Ileus	3	1	..	..	1	..
Hæmatemesis	15	1	..	..	..	..
Hernia	37	1	10	..	12	..
Hæmorrhois	306	..	130	..	33	..
Fistula in Ano	41	1	10	..	8	..
Prolapsus Ani	4	..	..	..	..	..
Strictura Recti	..	..	..	..	1	..
Splenitis	220	2	44	..	31	..

Abstract No. 27—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	34,237		10,793		11,866	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Hepatitis Acuta	1,786	82	372	30	199	21
„ Chronica ..			439	15	282	9
Icterus	162	1	49	..	66	1
Ascites	8	4	3	..	2	..
Melæna	1	1	..	..	..	..
Cholelithus	1	..	..	..	..	..
Cirrhosis	..	..	..	..	2	..
Fistula Salivaris	..	..	1	..	..	..
Strictura Æsophagi	..	..	1	..	..	..
5. Urinary System:						
Nephritis	29	..	9	..	4	..
Nephria	11	3	5	1	5	..
Ischuria	8	..	2	..	8	..
Hæmaturia	3	..	3	..	1	..
Lithiasis	3	..	1	..	..	..
Cystitis	11	..	1	..	4	..
Fistula in Perineo	..	..	6	..	1	..
Enuresis	16	..	17	..	3	..
Diuresis	2	..	3	..	..	..
Diabetes	1	..	1	..	..	..
Calculus Vesicæ	1	..	1	..	..	..
Morbus Prostaticus	1	..	..	..	..	..
„ Addisonii	1	1	..	..	..	..
6. Reproductive System:						
Varicocele	9	..	3	..	2	..
Hydrocele	29	..	22	..	13	..
Orchitis (not Gonorrhœal) ..	514	..	202	..	158	..
Fungus Testis	1	..	..	..	..	..
7. Locomotive System:						
Arthritis	31	..	9	..	6	..
Synovitis	63	..	10	1	11	..
Hydrarthrus	1	..	1	..	..	..
Contractura	6	..	3	..	..	..
Periostitis	63	..	5	..	25	..
Exostosis	3	..	1	..	..	..
Caries	21	..	1	..	1	..
Necrosis	7	..	2	..	..	..
Atrophia Musculorum	..	..	2	..	..	..
8. Integumentary System:						
Urticaria	13	..	7	..	12	..
Eczema	102	..	32	..	21	..
Herpes	107	..	65	..	27	..
Impetigo	8	..	5	..	3	..
Psoriasis	36	..	7	..	19	..
Lichen	7	..	4	..	2	..
Roseola	2	..	1	..	2	..
Pemphigus	1	..	12	..	2	..
Rupia	5	..	..	..	..	..
Ecthyma	1	..	2	..	2	..
Acne	5	..	..	..	..	..
Prurigo	3	..	..	..	..	..
Pityriasis	2	..	..	..	1	..
Lepra	4	..	..	..	..	..

Abstract No. 27—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	34,237		10,793		11,866	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Phlegmon	989	..	437	..	390	..
Abscessus	492	..	136	..	209	..
Paronychia	121	..	28	..	44	..
Ulcus	1,048	..	390	..	472	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	446	3	252	..	131	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	40	..	8	..	11	..
Explosio	11	..	3	..	2	..
Insolatio	188	71	19	8	29	11
Submersio	1	13	..	5	..	5
Suspendium	1	..	..	..	..	..
Asphyxia	..	2	..	..	..	..
Fractura	154	5	66	3	44	1
Suffocatio	1	1	..	..	..	..
Amputatio	5	1	..	..	3	..
Ictus Fulminis	..	..	3	1	..	..
Contusio	1,772	3	632	..	668	..
Commotio	10	1	2	1	3	..
Vulnus Sclopetarium	22	2	2	..	8	1
„ Incisum	324	..	140	..	166	..
Luxatura	34	..	11	..	13	..
Subluxatio	712	..	235	..	223	..
Vesiculæ Pedis	97	..	37	..	35	..
Venenatio	1	..	1	..	..	..
Morsus Canis	26	..	2	..	2	..
„ Equi	3	..	..	..	1	..
„ Scorpionis	1	..	..	..	..	..
„ Hominis	1	..	..	..	..	..
„ Serpentis	1	1	..	..	1	..
„ Insecti	..	..	1	..	..	..
„ Centipedis	..	..	..	..	1	..
„ Felis	..	..	..	..	1	..
„ Piscis	..	..	..	..	2	..
Ictus Apis	1	..	..	..	..	..
3. Homicidal:						
Vulnus Incisum	2	..	..	..	1	..
Contusio	1	1	..	..	..	..
4. Suicidal:						
Vulnus Sclopetarium	2	2	..	4	..	7
„ Incisum	4	1	..	2	1	2
Suspendium	..	1	..	1	..	..
Submersio	..	1	1	1	..	..
Suicidium	..	1	..	..	..	..
6. Punitus	18	..	5	..	18	..
Diseases not stated	24	..	..	..	..	..
No appreciable disease	..	..	10	..	1	..
Total	48,172	1,094	14,963	297	15,294	223

Abstract No. 27—*continued.*

CAUSES of the Deaths of the Invalids.

	Bengal.	Madras.	Bombay.
I.—1. Dysenteria	10	1	4
Diarrhœa	6	2	..
Febris Intermittens ..	1	..	..
Rheumatismus	1	..	..
2. Syphilis Secundaria ..	3	2	..
II.—1. Anæmia..	1	..	1
Anasarca	1	1	..
2. Phthisis Pulmonalis ..	24	8	8
Hæmoptysis	1	1	..
III.—1. Apoplexia	..	1	..
Paralysis	1	1	1
Cephalæa	1	..	..
Delirium Tremens ..	1	..	..
2. Carditis	..	1	1
Morbus Valv: Cordis ..	1	1	2
Hypertrophia „ ..	1	..	..
Aneurisma	3	1	1
3. Laryngitis	..	1	..
Bronchitis	..	..	1
Pneumonia	1	..	..
Emphysema	1	..	..
4. Hepatitis	4	2	2
5. Nephritis	1	..	..
Nephria..	1	..	..
IV.—4. Asthenia	..	..	1
V.—1. Submersio	2	1	..
Insolatio	1	..	..
Total	67	24	22

APPENDIX No. XXI—*continued.*

ABSTRACT No. 28, showing the Number of Men sent Home as Invalids from Bengal, Madras, and Bombay, during the Year 1867. Also the Number of Invalids from India finally Discharged the Service at the Invalid Depôt in England during the Year.

Stations	Bengal.	Madras.	Bombay.	India.
Strength	34,237	10,793	11,866	56,896
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
I. *Zymotic Diseases.*				
1. Miasmatic Diseases:				
Tonsillitis	1	..	..	..
Ophthalmia..	14	9	16	25
Dysenteria	62	60	14	10
Diarrhœa	23	4	7	4
Febris Intermittens	104	16	17	6
„ Remittens	9	..	..	..
„ Continua	6	..	1	..
Rheumatismus	127	42	52	69
2. Enthetic Diseases:				
Syphilis Primaria	..	3	..	..
„ Secundaria	94	43	28	69
Cachexia Syphiloidea	..	5	3	..
Iritis Syphilitica	1	..	..	..
Bubo	..	3	1	1
Strictura Urethræ	11	3	3	..
3. Dietic Diseases:				
Scorbutus	..	..	2	1
Purpura	1	..	..	..
4. Parasitic Diseases:				
Porrigo	..	..	..	2
II. *Constitutional Diseases.*				
1. Diathetic Diseases:				
Lumbago	1	1	2	3
Anæmia	57	7	31	10
Anasarca	..	3	..	..
Tumores	..	..	..	1
Carcinoma	1	..	..	..
Lupus	1	..	..	..
2. Tubercular Diseases:				
Scrofula	16	3	2	4
Phthisis Pulmonalis	107	52	41	240
Hæmoptysis	6	2	..	1
Tuberculosis	2	..	..	7
Abscessus Psoanus..	1	..	..	..
Morbus Coxarius	..	..	1	..
III. *Local Diseases.*				
1. Nervous System:				
Encephalitis	2	..	..	..
Meningitis	..	1	..	..
Apoplexia	..	1	..	..
Paralysis	27	5	11	42
Delirium Tremens..	..	1	..	..
Mania	5	2	7	..

Abstract No. 28—*continued.*

Stations	Bengal.	Madras.	Bombay.	India.
Strength	34,237	10,793	11,866	56,896
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
Amentia	11	5	11	..
Epilepsia	23	4	4	14
Convulsio	1	..	..	1
Chorea	1	1	..	1
Hysteria	..	1	..	..
Cephalæa	28	6	12	3
Neuralgia	4	1	1	2
Dysecœa	8	6	6	12
Otitis	4	1	1	1
Cæcitas	4	..	8	27
Myopia	1	1	..	..
Amaurosis	1	1	2	..
Amblyopia	1	..	..	..
Hemeralopia	1	..	..	..
Cataractes	..	..	1	..
Pterygium	1	..	..	..
2. Circulatory System:				
Carditis	1	10	6	5
Pericarditis	1	..	1	..
Hypertrophia Cordis	47	5	8	16
Atrophia	2	..	1	..
Morbus Valv: Cordis	68	18	19	107
Degeneratio Cordis	2	1	..	..
Aneurisma Aortæ	4	4	2	..
Aneurisma	1	2	1	14
Varix	13	5	5	28
Angina Pectoris	1	1	..	2
Palpitatio	6	..	..	..
Syncope	1	..	..	..
Phlebitis	1	..	..	..
Arteritis	..	..	1	3
3. Respiratory System:				
Laryngitis	..	..	1	3
Bronchitis	29	16	28	22
Pleuritis	2	2	4	5
Pneumonia	3	..	1	..
Asthma	2	1	..	1
Emphysema	1	..	1	17
Epistaxis	1	..	..	..
4. Digestive System:				
Gastritis	2	1	..	..
Enteritis	..	..	..	1
Dyspepsia	15	8	14	12
Ileus	1	..	..	..
Hæmatemesis	1	..	..	..
Hernia	19	3	4	26
Hæmorrhois	1	1	1	1
Fistula in Ano	4	..	1	..
Strictura Recti	..	..	1	1
Prolapsus Ani	..	..	..	1
Splenitis	9	2	2	6
Hepatitis	222	93	53	96
Icterus	..	1	..	..
Ascites	..	1	..	4

Abstract No. 28—*continued.*

Stations	Bengal.	Madras.	Bombay.	India.
Strength	34,237	10,793	11,866	56,896
Causes of Disability.	Sent home.	Sent home.	Sent home.	Discharged at Netley.
5. Urinary System:				
Nephritis	1	..	..	..
Nephria	2	..	1	3
Hæmaturia	..	1	..	..
Lithiasis	1	..	..	..
Calculus Vesicæ	..	..	..	1
Fistula in Perineo	..	3	..	..
Enuresis	1	..	..	..
Diabetes	1	..	..	..
Morbus Prostaticus	1	..	..	..
6. Reproductive System:				
Varicocele	2	1	..	1
Hydrocele	..	..	1	1
Orchitis (not Gonorrhœal)	5	4	7	2
Sarcocele	..	1	..	..
7. Locomotive System:				
Arthritis	2	1	..	14
Synovitis	5	3	2	1
Contractura	9	..	..	7
Periostitis	5	1	2	1
Exostosis	..	1	..	..
Caries	3	1	1	4
Necrosis	2	1	1	2
8. Integumentary System:				
Eczema	2	..	1	1
Herpes	..	2	..	..
Psoriasis	1	..	1	..
Lepra	..	1	..	..
Phlegmon	1	1	..	..
Abscessus	3	..	1	1
Ulcus	9	7	7	13
IV. *Developmental Diseases.*				
4. Diseases of Nutrition:				
Atrophia	299	74	43	126
Senectus	16	1	..	3
V. *Violent Deaths or Diseases.*				
1. Accidental:				
Explosio	..	..	1	..
Insolatio	13	2	1	2
Fractura	11	8	7	19
Amputatio	4	..	1	3
Contusio	3	1	2	..
Vulnus Sclopetarium	3	2	1	2
„ Incisum	2	..	1	1
Luxatura	2	1	..	2
Subluxatio	..	..	1	2
2. In Battle:				
Vulnus Sclopetarium	..	..	..	1
Total	1,637	586	523	1,145

APPENDIX No. XXI—*continued.*

ABSTRACT No. 29, showing the Ages of the Troops serving in the Bengal Presidency, and the Deaths at each Age, during the Year 1867.

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
5th Lancers	10	..	79	..	288	3	62	4	20	1	2	..	461	8
7th Hussars	..	..	75	..	300	1	102	4	37	..	18	..	532	5
19th „	2	..	42	..	199	2	185	2	27	1	19	1	474	6
20th „	..	..	..	..	151	5	240	7	77	..	11	..	479	12
21st „	..	..	2	..	235	6	207	2	12	1	2	..	458	9
A Brigade, Royal Horse Artillery.	6	..	285	5	252	7	157	2	31	3	1	..	732	17
F Battery, C Brig., Rl. H. Artillery	..	..	29	1	63	1	44	..	4	..	..	..	140	2
F Brigade, Royal Horse Artillery	19	..	177	10	353	20	223	17	69	3	6	..	847	50
8th „ Royal Artillery ..	16	..	95	2	174	7	120	2	38	4	2	1	445	16
16th „ „ ..	31	..	398	7	322	11	138	3	49	1	6	..	939	22
19th „ „ ..	6	..	317	14	335	11	261	11	83	3	9	1	1,011	40
22nd „ „ ..	6	..	189	3	253	7	130	7	45	3	7	..	630	20
24th „ „ ..	2	..	94	1	160	3	82	..	69	..	20	1	427	5
25th „ „ ..	12	..	118	4	121	1	76	4	26	1	12	..	365	10
1st Battalion, 3rd Foot	110	12	173	36	184	40	211	37	31	8	1	1	710	134
1st „ 5th „	97	..	376	7	155	9	57	2	25	..	1	1	711	19
1st „ 7th „	49	2	87	1	359	8	168	6	89	2	11	..	713	19
1st „ 11th „	22	..	224	1	318	5	155	2	59	1	6	..	784	9
2nd „ 12th „	27	..	342	3	294	12	110	3	68	2	11	3	847	23
1st „ 19th „	19	..	165	4	379	5	280	5	83	7	11	..	887	21
1st „ 23rd „	6	..	60	..	474	9	359	10	64	3	7	..	870	22
36th Regiment	5	..	197	5	355	12	174	8	113	4	11	4	855	33
37th „	109	1	206	..	284	4	69	5	30	..	..	..	698	10
38th „	46	..	243	2	429	5	231	8	104	..	6	..	1,059	15

Abstract No. 29—*continued.*

ABSTRACT showing the Ages of the Troops serving in the Bengal Presidency, &c.—*continued.*

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
41st Regiment	195	..	261	5	239	4	87	2	29	2	55	..	866	13
42nd „	11	2	184	24	404	42	116	15	41	3	2	1	758	87
46th „	27	..	352	1	343	5	189	3	67	2	7	1	985	12
55th „	121	..	356	3	285	6	112	4	33	1	2	1	909	15
58th „	49	..	173	2	312	5	122	1	71	..	8	..	735	8
77th „	45	7	162	21	466	25	138	14	44	2	3	1	858	70
79th „	5	..	260	6	320	9	52	11	24	1	..	..	661	27
88th „	18	..	100	1	461	5	264	5	48	1	9	..	900	12
90th „	113	1	160	12	352	7	198	11	38	1	2	..	863	32
91st „	13	..	97	1	359	5	230	5	98	1	33	..	830	12
93rd „	31	..	206	..	324	5	155	3	42	3	4	..	762	11
101st „	10	..	26	1	728	10	74	7	44	4	5	2	887	24
103rd „	18	..	260	4	255	13	145	7	146	9	27	..	851	33
104th „	11	..	106	..	581	3	169	3	20	..	2	..	889	6
105th „	90	1	177	3	219	6	266	5	50	..	43	1	845	16
107th „	38	2	233	4	406	15	150	16	64	6	5	..	896	43
3rd Battalion Rifle Brigade ..	4	..	106	..	530	3	276	4	91	2	2	..	1,009	9
Total	1,399	28	7,192	194	13,021	362	6,429	267	2,148	86	389	20	30,578	957

Abstract No. 29—*continued.*

ABSTRACT showing the Ages of the Troops serving in the Madras Command, and the Deaths at each Age, during the Year 1867.

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
16th Lancers	55	..	30	2	246	2	171	3	15	1	5	1	522	9
18th Hussars	33	..	126	..	225	7	40	5	15	2	2	1	441	15
D Brigade Royal Horse Artillery..	27	..	146	5	147	2	126	1	65	2	15	1	526	11
14th „ Royal Artillery ..	11	..	35	..	135	1	164	5	44	2	2	..	391	8
20th „ „ ..	5	..	161	1	226	7	200	3	86	..	25	1	703	12
23rd „ „ ..	7	..	151	..	333	2	219	5	74	3	20	2	804	12
1st Battalion 1st Foot	38	..	173	..	276	3	212	2	41	4	..	..	740	9
2nd „ 10th „	136	..	328	..	337	6	103	3	24	..	2	..	930	9
Hd. Qrs. 2nd Batt. 19th Foot ..	4	..	65	1	273	2	89	4	26	..	5	..	462	7
Right Wing 2nd Batt. 19th Foot..	..	..	203	1	150	7	21	3	..	..	..	..	374	11
2nd Battalion 21st Foot	14	1	191	8	449	16	120	15	34	6	2	..	810	46
2nd „ 24th „	67	..	252	2	332	5	74	..	13	3	..	..	738	10
3rd „ 60th „	2	1	75	2	509	5	123	7	29	1	5	..	743	16
76th Foot	64	1	341	1	203	6	82	4	71	1	4	..	765	13
102nd „	32	..	255	1	231	4	235	4	106	1	41	1	900	11
Total ..	495	3	2,532	24	4,072	75	1,979	64	643	26	128	7	9,849	199

Abstract No. 29—*continued.*

ABSTRACT showing the Ages of the Troops serving in the Bombay Command, and the Deaths at each Age, during the Year 1867.

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.		Total.	
	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
3rd Dragoon Guards	5	..	47	..	172	..	128	..	22	1	7	..	381	1
11th Hussars	30	..	140	4	163	8	104	4	8	..	4	..	449	16
E Brigade Royal Horse Artillery.	17	..	184	2	160	..	102	2	79	1	2	..	544	5
14th „ Royal Artillery ..	2	..	86	4	236	5	220	11	35	1	3	..	582	21
18th „ „	3	..	194	1	280	4	246	5	103	4	20	..	846	14
21st „ „	2	..	99	1	140	..	88	2	52	1	21	..	402	4
2nd Battalion 1st Foot	76	5	155	24	301	30	143	18	33	4	5	1	713	82
1st „ 2nd „	119	1	236	1	244	3	140	4	37	..	3	..	779	9
26th Regiment	203	..	316	2	177	..	100	2	52	2	18	..	866	6
45th „	187	1	321	5	241	4	50	1	29	1	..	1	828	13
49th „	50	..	225	4	273	2	212	5	92	4	10	..	862	15
95th „	27	..	113	2	434	2	223	4	98	1	9	..	904	9
96th „	124	..	277	..	238	6	125	2	27	1	..	..	791	9
109th „	44	..	267	1	276	1	174	..	52	4	26	2	839	8
Total	889	7	2,660	51	3,335	65	2,055	60	719	25	128	4	9,786	212

APPENDIX No. XXI—*continued.*

ABSTRACT No. 30, showing the Cases of Sickness, and Deaths, among Troops on board Ship, proceeding on Foreign Service.

Stations	To Mediterranean.		To Cape of Good Hope.		To India, Eastern Straits Settlements, and Ceylon.		To India, viâ Egypt.	
Number of Men embarked ..	5,673		1,267		2,339		3,827	
Average Annual Strength ..	156		202		719		425	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic:								
Varicella	..	..	..	..	1	..	..	..
Morbilli	..	..	..	..	3	..	..	..
Scarlatina	..	..	..	..	1	..	..	..
Tonsillitis	2	..	..	..	25	..	18	..
Influenza	2	..	1	..	11	..	..	..
Ophthalmia	2	..	3	..	10	..	6	..
Erysipelas	..	..	..	..	5	..	2	..
Furunculus	2	..	1	..	10	..	4	..
Dysenteria Acuta ..	..	..	1	..	..	..	..	..
Diarrhœa	..	..	2	..	13	..	19	..
Febris Intermittens.	..	..	1	..	5	..	1	..
„ Typhus ..	..	..	..	..	1	1	..	..
„ Continua ..	4	..	9	..	2	..	9	..
Rheumatismus Acut:	1	..	1	..	13	..	9	..
„ Chron:	1	..	..	..	3	..	4	..
2. Enthetic:								
Syphilis Primaria ..	18	..	21	..	39	..	71	..
„ Secundaria	1	..	1	..	45	..	1	..
Bubo	7	..	2	..	10	..	17	..
Gonorrhœa	12	..	4	..	46	..	68	..
Phymosis, &c. ..	1	..	1	..	1	..	..	..
Orchitis (Gonorrhœal)	..	..	2	..	2	..	2	..
Strictura Urethræ ..	..	..	..	..	1	..	..	..
3. Dietic:								
Scorbutus	..	..	1	..	..	..	..	..
Purpura	..	..	1	..	1	..	..	..
Ebriositas	..	..	1	..	..	..	..	..
4. Parasitic:								
Scabies	..	..	2	..	2	..	4	..
Ascaris Lumbricoides	1	..	..	..	..	..	..	..
II. *Constitutional Diseases.*								
1. Diathetic:								
Anæmia	..	..	..	..	9	..	..	..
Anasarca	..	..	..	..	1	..	..	..

Abstract No. 30—*continued.*

Stations	To Mediterranean.		To Cape.		To India, Eastern Straits Settlements, and Ceylon.		To India, viâ Egypt.	
Number of Men embarked ..	5,673		1,267		2,339		3,827	
Average Annual Strength ..	156		202		719		425	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:								
Scrofula	1	..	..	..	1	..	..	..
Phthisis Pulmonalis	..	..	..	..	4	1	..	..
Hæmoptysis ..	1	..	..	..	2	..	..	..
III. *Local Diseases.*								
1. Nervous Syst:								
Encephalitis ..	..	..	..	..	1	1	..	..
Epilepsia	..	..	..	..	7	1	..	..
Cephalæa	..	..	..	..	..	..	2	..
Neuralgia	..	..	..	..	..	..	1	..
Otitis	..	..	..	..	9	..	5	..
Iritis	..	..	1	..	1	..	..	..
Sclerotitis	..	..	..	..	2	..	..	..
2. Circulatory Syst:								
Morbus Valv: Cordis	..	..	..	..	1	..	..	..
Aneurisma	..	..	..	..	2	..	..	..
3. Respiratory Syst:								
Bronchitis Acuta	2	..	2	..	29	..	25	..
„ Chronica	2	..	..	..	3	..	..	..
Pneumonia	1	..	1	..	..	..	2	..
4. Digestive Syst:								
Gastritis	..	..	..	..	1	..	..	..
Stomatitis	..	..	..	..	1	..	..	..
Obstipatio	..	..	1	..	..	..	..	..
Dyspepsia	1	..	2	..	15	..	8	..
Colica	..	..	..	..	16	..	..	..
Hernia	..	..	..	..	1	..	..	..
Hæmorrhois ..	..	..	..	..	2	..	1	..
Hepatitis Chronica .	1	..	..	..	3	..	..	..
Icterus	..	..	..	..	3	..	..	..
5. Urinary Syst:								
Nephritis	..	..	..	..	..	..	1	..
6. Reproductive System:								
Hydrocele	..	..	..	..	1	..	..	..
Orchitis (not Gonorr.)	..	..	1	..	6	..	4	..
7. Locomotive Syst:								
Synovitis	..	..	1	..	1	..	1	..

Abstract No. 30—*continued.*

Stations ..	To Mediterranean.		To Cape.		To India, Eastern Straits Settlements, and Ceylon.		To India, viâ Egypt.	
Number of Men embarked ..	5,673		1,267		2,339		3,827	
Average Annual Strength ..	156		202		719		425	
Diseases.	**Admitted.**	**Died.**	**Admitted.**	**Died.**	**Admitted.**	**Died.**	**Admitted.**	**Died.**
8. Integumentary System:								
Eczema	..	..	1	..	5	..	1	..
Herpes	1	..	1	..	..	..	..	..
Impetigo	..	..	..	..	..	..	1	..
Psoriasis	..	..	..	..	5	..	..	..
Phlegmon	1	..	4	..	30	..	19	..
Abscessus	.	..	5	..	8	..	2	..
Paronychia	..	..	..	..	3	..	..	..
Ulcus	3	..	4	..	10	..	19	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	..	..	..	..	4	..	..	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	1	..	..	..	5	..	2	..
Insolatio	..	..	..	..	6	..	..	..
Submersio	..	..	..	..	..	1	..	..
Fractura	2	..	..	..	1	..	1	..
Amputatio	..	..	..	..	..	..	1	..
Contusio	2	..	8	..	15	..	16	..
Commotio	..	..	..	..	2	..	..	..
Vulnus Sclopetarium	..	..	..	..	1	..	..	..
„ Incisum ..	1	..	1	..	21	..	..	..
Luxatura	..	..	1	..	..	..	..	..
Subluxatio	2	..	..	..	2	..	7	..
6. Punitus ..	..	..	..	..	4	..	..	..
Total	76	..	89	..	494	5	354	..

APPENDIX No. XXI—*continued.*

ABSTRACT No. 31, showing the Cases of Sickness, and Deaths, among Troops on Board Ship, proceeding on Passage Home.

Stations ..	From Mediterranean, British America, and West Indies.		From Mauritius, Cape of Good Hope, and Australasia.		From India by the Cape.		From India *vid* Egypt.	
Number of Men embarked	3,595		3,378		3,316		1,785	
Average Annual Strength ..	171		680		1,759		262	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*								
1. Miasmatic:								
Morbilli	..	..	..	..	11	..	3	..
Tonsillitis	2	..	6	..	11	..	3	..
Influenza	..	..	4	..	10	..	3	..
Ophthalmia.. ..	1	..	26	..	44	..	4	..
Erysipelas	1	..	1	..	1	..	..	..
Furunculus	..	..	3	..	4	..	..	..
Anthrax	..	..	..	..	..	..	1	..
Dysenteria Acuta ..	..	..	32	1	8	1	5	..
„ Chronica	..	..	..	..	5	1	5	1
Diarrhœa	..	..	38	..	48	1	8	..
Cholera (Bilious) ..	..	..	..	..	3	..	..	..
Febris Intermittens	..	..	13	..	74	..	20	..
„ Remittens ..	1	..	8	..	2	1	..	..
„ Typhus ..	..	..	..	..	7	..	..	..
„ Continua ..	8	..	9	..	2	..	3	..
Rheumatismus Acut:	1	..	6	..	17	..	2	..
„ Chron:	..	..	9	..	29	..	6	..
Parotitis	..	..	..	..	1	..	1	..
2. Enthetic:								
Syphilis Primaria ..	15	..	8	..	39	..	3	..
„ Secundaria	1	..	14	..	47	..	2	..
Iritis Syphilitica ..	..	..	..	..	3	..	..	..
Bubo	11	..	7	..	7	..	3	..
Gonorrhœa	5	..	9	..	42	..	3	..
Orchitis(Gonorrhœal)	..	..	1	..	5	..	..	..
Strictura Urethræ ..	..	..	..	..	2	..	..	..
Verrucæ	1	..	..	..	1	..	..	..
3. Dietic:								
Scorbutus	..	..	4	..	..	..	..	..
Ebriositas	1	..	..	1	1	..	1	..
4. Parasitic:								
Vermes	..	..	..	..	1	..	..	..
II. *Constitutional Diseases.*								
1. Diathetic:								
Lumbago	..	..	..	..	..	..	1	..
Anæmia	..	..	..	..	7	1	..	..
Anasarca	1	1	..	..	2	..	..	..

Abstract No. 31—*continued.*

Stations ..	From Mediterranean, British America, and West Indies.		From Mauritius, Cape of Good Hope, and Australasia.		From India by the Cape.		From India *vid* Egypt.	
Number of Men embarked	3,595		3,873		3,816		1,735	
Average Annual Strength ..	171		680		1,759		262	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:								
Scrofula	..	..	..	..	2	..	..	..
Phthisis Pulmonalis	1	1	4	3	3	4	..	..
Hæmoptysis ..	..	..	..	..	2	..	..	..
Abscessus Psoanus..	..	..	..	..	1	..	..	..
III. *Local Diseases.*								
1. Nervous System:								
Apoplexia	..	..	1	..	..	..	..	..
Paralysis	1	..	..	..	3	..	1	..
Delirium Tremens..	1	..	1	1	..	..	..	..
Amentia	..	..	..	..	..	1	..	..
Epilepsia	..	..	2	..	..	..	2	..
Cephalæa	..	..	..	..	..	..	1	..
Neuralgia	..	..	2	..	5	..	1	..
Otitis	..	..	..	..	1	..	..	..
Retinitis	..	..	..	..	2	..	..	..
Iritis	..	..	..	..	2	..	..	..
2. Circulatory Syst:								
Pericarditis.. ..	..	..	..	..	1	..	..	..
Hypertrophia Cordis	..	..	..	..	1	..	..	..
Morbus Valv. Cordis	..	..	1	..	1	..	..	..
Aneurisma Aortæ ..	..	1	..	..	..	..	..	..
„	..	..	1	2	..	..	..	..
Palpitatio	..	..	1	..	..	..	..	..
3. Respiratory Syst:								
Laryngitis	..	..	..	..	1	..	..	..
Bronchitis Acuta ..	3	..	38	..	18	..	7	..
„ Chronica	..	..	6	..	4	1	1	..
Pleuritis	..	..	..	..	5	..	..	..
Pleurodynia . ..	..	..	..	..	1	..	..	..
Pneumonia	..	..	1	..	3	..	1	1
Asthma	..	..	1	1	..	..	..	..
Emphysema . ..	..	..	1	..	..	..	..	..
4. Digestive Syst:								
Gastritis	..	..	..	..	..	..	1	..
Dyspepsia	..	..	3	..	4	..	..	..
Colica	1	..	..	..	3	..	1	..
Hæmorrhois ..	1	..	..	..	2	..	1	..
Fistula in ano ..	..	..	2	..	2	..	..	..
Hepatitis Acuta ..	..	..	4	2	4	1	2	..
„ Chronica..	1	..	3	..	15	3	2	..
Icterus	..	..	1	..	5	..	2	..

Abstract No. 31—*continued.*

Stations ..	From Mediterranean, British America, and West Indies.		From Mauritius, Cape of Good Hope, and Australasia.		From India by the Cape.		From India *vid* Egypt.	
Number of Men embarked	3,595		3,373		3,316		1,735	
Average Annual Strength ..	171		680		1,759		262	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
5. Urinary System:								
Nephritis	..	..	1	..	..	..	..	..
Enuresis	..	..	..	..	1	..	..	..
6. Reproductive Syst:								
Varicocele	..	..	..	..	1	..	..	..
Orchitis (not Gonorr.)	1	..	4	..	3	..	1	..
7. Locomotive Syst:								
Synovitis	..	..	..	..	4	..	..	..
Periostitis	..	..	..	..	..	..	1	..
Necrosis	..	..	..	..	2	..	..	..
8. Integument: Syst:								
Urticaria	..	..	..	..	1	..	..	..
Eczema	..	..	..	..	8	..	..	..
Herpes	..	..	..	..	1	..	..	..
Impetigo	..	..	..	..	1	..	..	..
Psoriasis	..	..	..	..	2	..	..	..
Pernio	..	..	5	..	..	..	..	..
Pityriasis	..	..	1	..	..	..	..	..
Phlegmon	4	..	12	..	37	..	2	..
Abscessus	4	..	5	..	2	..	2	..
Paronychia	1	..	2	..	..	..	..	..
Ulcus	..	..	15	..	51	..	7	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	3	..	4	1	8	..	..	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	1	..	1	..	12	..	..	..
Fractura	2	..	1	..	3	..	..	..
Contusio	3	..	24	..	34	..	4	..
Commotio	..	..	..	..	2	..	..	..
Vulnus Sclopetarium	..	..	..	..	1	..	..	..
„ Incisum ..	..	..	7	..	17	..	1	..
Subluxatio	3	..	4	..	8	..	..	..
4. Suicidal:								
Submersio	..	..	..	1	..	..	..	..
No appreciable disease ..	..	..	1	..	1	..	..	..
Total	80	3	358	13	725	15	118	2

APPENDIX No. XXI—*continued.*

ABSTRACT No. 32, showing the Cases of Sickness and Deaths among Troops on Board Ship proceeding from one Colony or Station to another.

Stations	Between Mediterranean, British America, and West Indies, and between Gibraltar and Mauritius.		Between India, Abyssinia, Cape of Good Hope, Mauritius, Ceylon, China, and Japan.		Australasia.	
Number of Men Embarked	6,040		4,353		559	
Average Annual Strength	468		325		73	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Zymotic Diseases.						
Miasmatic:						
Variola	..	..	1	..	..	..
Tonsillitis	2	..	5	..	..	..
Influenza	4	..	1	..	..	..
Ophthalmia	5	..	5	..	5	..
Erysipelas	1	..	..	..	..	..
Furunculus	2	..	1	..	..	..
Anthrax	2	..	..	..	..	..
Dysenteria Acuta	..	..	5	..	..	..
„ Chronica	..	..	5	..	..	..
Diarrhœa	18	2	11	..	..	..
Cholera Spasmodica	1	1	4	3	..	..
Febris Intermittens	1	..	28	..	..	..
„ Remittens	..	..	15	..	..	..
„ Typhoides	1	..	..	..	..	..
„ Continua	8	..	8	..	..	..
Rheumatismus Acutus	7	..	7	..	..	..
„ Chronicus	8	..	6	..	..	..
2. Enthetic:						
Syphilis Primaria	13	..	19	..	..	..
„ Secundaria	3	..	6	..	..	..
Bubo	7	..	7	..	..	..
Gonorrhœa	7	..	22	..	1	..
Orchitis (Gonorrhœal)	..	..	1	..	..	..
Strictura Urethræ	1	..	..	..	..	..
Ulcus Penis	..	..	3	..	..	..
3. Dietic:						
Scorbutus	..	..	3	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Anasarca	1	..	..	..	..	..
2. Tubercular:						
Scrofula	1	..	..	..	..	..
Phthisis Pulmonalis	3	..	..	..	1	..
Hæmoptysis	2	..	..	..	..	..

Abstract No. 32—*continued.*

Stations	Between Mediterranean, British America, and West Indies, and between Gibraltar and Mauritius.		Between India, Abyssinia, Cape of Good Hope, Mauritius, Ceylon, China, and Japan.		Australasia.	
Number of Men Embarked ..	6,040		4,353		559	
Average Annual Strength ..	468		325		73	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
III. *Local Diseases.*						
1. Nervous System:						
Apoplexia	1	..	1	1	..	..
Paralysis	1	..	1	..	..	..
Delirium Tremens	2	2	6	2	..	..
Mania	..	..	1	..	..	..
Epilepsia	1	..	1	..	..	..
Cephalæa	..	..	2	..	..	..
Neuralgia	1	..	..	..	..	..
Otitis	..	..	1	..	..	..
Cæcitas	1	..	..	..	..	..
3. Respiratory System:						
Bronchitis Acuta	11	1	9	..	..	..
„ Chronica	5	..	1	..	1	..
Pleuritis	1	..	4	..	..	..
Pneumonia	1	..	..	..	..	..
4. Digestive System:						
Peritonitis	1	1	..	..	..	..
Dyspepsia	18	..	3	..	1	..
Hæmorrhois	..	..	1	..	..	..
Splenitis	..	..	2	..	..	..
Hepatitis Acuta	..	..	2	1	..	..
„ Chronica	1	..	1	..	..	..
Icterus	3	1	1	..	..	..
6. Reproductive System:						
Hydrocele	..	..	1	..	..	..
Orchitis (not Gonorrhœal) ..	3	..	1	..	..	..
8. Integumentary System:						
Impetigo	..	..	1	..	..	..
Psoriasis	..	..	1	..	..	..
Phlegmon	3	..	2	..	1	..
Abscessus	3	..	2	..	..	..
Paronychia	1	..	2	..	..	..
Ulcus	13	..	16	..	..	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	4	..	9	..	..	..

Abstract No. 32—*continued.*

Stations	Between Mediterranean, British America, and West Indies, and between Gibraltar and Mauritius.		Between India, Abyssinia, Cape of Good Hope, Mauritius, Ceylon, China, and Japan.		Australasia.	
Number of Men Embarked ..	6,040		4,358		559	
Average Annual Strength ..	468		325		73	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Insolatio	..	..	1	..	..	..
Fractura	..	..	1	..	..	..
Contusio	15	..	9	..	2	..
Vulnus Incisum	2	..	5	..	..	..
Subluxatio	3	..	5	..	..	..
Vesiculæ Pedis	1	..	1	..	..	..
2. Suicidal:						..
Submersio	..	3	..	..	..	..
6. Punitus	..	..	1	..	..	..
Total	204	11	258	7	12	..

APPENDIX

Abstract of Results of Meteorological Observations

Aldershot Camp. Lat. 51° 15′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·273	29·686	28·441	55·0	0·8	54·2	40·9	27·0	13·9	33·9	61·6	24·0	35·0	33·9
February	29·665	30·140	28·593	56·3	34·0	22·3	50·0	38·8	11·2	44·4	73·5	35·9	45·9	42·5
March	29·386	30·277	28·863	57·0	23·5	33·5	43·6	32·1	11·4	37·8	75·1	28·4	39·0	36·9
April	29·408	29·993	28·814	66·0	32·0	34·0	58·4	42·4	16·0	50·4	101·5	36·2	52·4	48·7
May	29·503	29·751	29·034	83·0	29·0	54·0	64·1	44·0	20·1	54·0	115·2	32·5	57·5	52·6
June	29·758	30·135	29·347	82·0	38·4	43·6	70·5	48·0	22·5	59·2	118·7	37·8	64·1	56·8
July	29·509	29·890	29·104	82·5	43·3	39·2	71·5	50·4	21·1	60·9	120·5	49·2	64·6	57·7
August	29·620	29·823	29·364	87·2	44·4	42·8	73·3	53·0	20·3	63·1	120·8	51·8	67·9	61·0
September ...	29·698	30·084	29·423	78·0	37·0	41·0	67·4	49·7	17·7	58·5	106·9	47·3	61·3	57·1
October... ...	29·537	30·015	29·076	65·0	31·8	33·2	56·5	42·2	14·3	49·3	81·2	40·2	51·3	48·5
November ...	29·882	30·220	29·182	60·8	26·0	34·8	47·7	34·5	13·2	41·1	64·0	32·5	41·9	39·9
December ...	29·629	29·963	28·653	54·4	16·8	37·6	42·8	31·7	11·1	37·2	53·6	30·4	38·2	37·1
Yearly Sums, Means, and Totals ...	29·572	29·998	28·993	68·9	29·8	39·2	57·2	41·1	16·1	49·1	91·0	37·2	51·6	47·7

Devonport. Lat. 50° 17′ N.

January	29·607	30·162	28·862	57·0	13·4	43·6	44·9	29·7	15·2	37·3	68·0	23·1	39·5	36·4
February	30·043	30·557	29·048	59·4	24·5	34·9	52·9	39·7	13·2	46·3	72·7	34·8	48·5	46·7
March	29·655	30·604	29·184	61·0	24·5	36·5	49·5	33·4	16·1	41·4	84·5	28·0	43·2	40·4
April	29·709	30·423	28·983	68·0	33·3	34·7	61·0	41·8	19·2	51·4	101·4	35·9	54·0	50·8
May	29·648	30·013	29·159	73·3	31·0	42·3	63·5	44·7	18·8	54·1	106·3	36·6	57·3	53·1
June	29·931	30·388	29·454	82·5	40·2	42·3	71·1	47·4	23·7	59·2	115·7	39·5	64·0	57·7
July	29·718	30·116	29·094	78·0	41·2	36·8	72·8	49·9	22·9	61·3	121·4	40·4	65·2	60·1
August	29·809	30·045	29·488	83·0	42·8	40·2	73·6	51·6	22·2	62·7	116·5	40·5	67·2	64·5
September ...	29·920	30·382	29·538	75·0	33·5	41·5	69·0	46·6	22·4	57·8	111·5	35·8	62·7	57·7
October	29·765	30·336	29·340	67·0	32·2	34·8	61·2	43·8	17·4	52·5	96·4	37·6	55·2	52·5
November	30·095	30·448	29·321	63·0	25·6	37·4	53·0	34·7	18·3	43·8	81·5	27·8	46·3	43·7
December	29·845	30·136	28·776	57·0	18·4	38·6	48·1	32·4	15·7	40·2	74·2	27·3	42·5	40·6
Yearly Sums, Means, and Totals ...	29·812	30·301	29·187	68·7	30·0	38·6	60·1	41·3	18·8	50·7	95·8	33·9	53·8	50·5

Portsmouth. Lat. 50° 45′ N.

				*	*	*	*	*	*	*				
January	29·718	30·268	28·844	...	17·2	...	...	29·8	...	...	55·6	25·9	37·5	36·1
February	30·116	30·581	29·000	62·2	31·0	31·2	54·3	39·4	14·9	46·8	68·1	35·0	47·2	44·7
March	29·800	30·750	29·204	60·0	27·0	33·0	46·1	32·9	13·2	39·5	72·9	28·9	40·7	38·3
April	29·842	30·442	29·130	64·0	30·2	33·8	58·3	42·5	15·8	50·4	95·5	37·3	52·9	48·9
May	29·876	30·153	29·385	81·3	32·2	49·1	63·1	45·5	17·6	54·3	103·7	38·9	57·1	51·6
June	30·110	30·558	29·692	80·0	42·8	37·2	70·9	49·4	21·5	60·1	116·0	44·7	64·0	56·3
July	29·909	30·310	29·492	78·2	43·6	34·6	70·0	52·5	17·5	61·2	115·3	46·9	64·1	57·6
August	30·006	30·219	29·696	84·8	41·0	43·8	72·0	53·9	18·1	62·9	110·6	47·9	66·6	60·1
September ...	30·093	30·522	29·790	77·0	38·2	38·8	67·9	51·8	16·1	59·8	102·4	46·1	62·6	56·7
October... ...	29·926	30·461	29·490	64·0	33·0	31·0	58·8	43·4	15·4	51·1	85·1	38·2	53 4	49 6
November ...	30·290	30·639	29·600	62·4	26·6	35·8	50·5	35·6	14·9	43·0	83·2	31·2	44·7	41·6
December ...	30·062	30·369	28·955	56·0	20·6	35·4	44·9	31·7	13·2	38·3	53 9	25·4	40·5	38·6
Yearly Sums, Means, and Totals ...	29·979	30·438	29·356	70·0	33·3	36·7	59·7	43·5	16·2	51·6	86·9	37·2	52·5	49·2

* For eleven months only.

No. XXII.

taken at Home Stations in the Year 1867.

Long. 0° 45′ W. Height above Sea 325 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	25 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
32·1	·182	2·1	0·3	89·0	548·6	8·50	4·00	6·50	12·00	0·00	...	333·0	7·9	2·2	17	3·07	1·72
38·6	·236	2·7	0·9	76·1	543·4	4·50	4·50	11·50	7·50	0·00	...	308·0	8·4	2·9	17	1·84	1·08
34·1	·197	2·3	0·5	83·3	546·0	9·50	12·50	3·50	5·50	0·00	...	302·0	7·9	2·5	19	3·14	1·80
44·9	·299	3·4	1·1	76·2	531·4	3·00	2·00	7·50	17·50	0·00	...	436·0	7·9	2·8	17	2·23	1·37
47·9	·334	3·8	1·5	70·5	527·7	5·00	11·00	8·50	6·50	0·00	...	243·0	7·7	2·3	11	1·18	0·65
50·8	·370	4·1	2·5	61·8	525·2	12·00	4·00	4·00	10·00	0·00	...	242·0	6·6	2·8	8	1·37	1·14
52·0	·389	4·3	2·4	63·4	520·2	7·00	4·50	7·50	12·00	0·00	...	254·0	7·6	3·1	14	4·24	3·20
55·6	·442	4·8	2·6	63·5	518·8	3·00	3·00	11·50	13·50	0 00	...	253·0	7·3	4·0	10	2·03	1·74
53·4	·409	4·6	1·5	76·0	526·7	6·50	3·00	8·00	12·50	0·00	...	262·0	7·2	2·8	11	2·07	1·50
45·6	·308	3·5	0 8	81·2	534·8	6·00	3·00	9·00	13·00	0·00	...	252·0	7·8	2 4	22	2·51	1·73
37·4	·226	2·6	0·5	85·8	551·8	11·50	5·00	3·00	10·50	0·00	...	211·0	7·7	2·3	7	0·37	0·24
35·6	·208	2·4	0·3	90·5	551·3	11·00	3·00	4·50	12·50	0. 00	...	301·9	8·5	2·4	14	1·85	0·89
44·0	·300	3·4	1·2	76·4	535·5	87·50	59·50	85·60	133·00	0·00	...	283·2	7·7	2·7	167	25·90	16·76

Long. 4° 5′ W. Height above Sea 35 feet.

37·0	·221	2·6	0·3	91·2	549·4	8·25	7·00	7·00	8·75	0·00	...	333·4	6·0	3·0	17	5·01	4·83
44·8	·297	3·3	0·5	87·4	547·1	1·25	5 75	8·75	11·75	0·50	...	286·1	8·5	3·1	24	3·45	3·12
37·1	·221	2·6	0·6	79·0	546·2	8·75	13·75	5·00	3·50	0·00	...	344·5	7·0	4·5	22	5·24	4·63
47·7	·329	3·7	1·0	78·8	534·9	2·00	2·25	10·50	15·25	0·00	...	...	8·0	4·0	18	2·83	2·64
49·2	·351	3·9	1·4	74·1	530·3	3·75	15·25	9·75	1·75	0·50	...	253·7	7·0	4·5	17	3·36	3·11
52·4	·395	4·4	2·2	65 8	528·3	7·50	5·75	8·75	7·50	0·50	...	163·9	5·5	4·5	10	0·93	0·87
55·7	·445	4·9	1·9	72·0	522·9	3·50	5·00	12·00	9·50	1·00	...	162·7	7·0	4·5	18	4·38	4·21
62·3	·564	6·2	1·2	84·5	521·8	2·50	6 00	12·00	8·50	2·00	...	115·7	7·0	4·0	13	1·09	0 97
53·5	·410	4·5	1·8	72·0	529·4	7·00	3·75	8·25	11·00	0·00	...	141·6	6·5	3·0	10	2·08	1·98
49·9	·360	4·0	0·9	83·0	534·6	6·00	3·00	8·00	11·00	3·00	...	165·1	7·0	2·5	20	2·95	2·78
40·7	·255	3·0	0·6	82·1	550·8	8·50	10·00	3·00	3·50	5·00	...	140·8	7·0	2·0	6	0·60	0·57
38·8	·236	2·7	0·4	87·1	550·3	10·75	6·00	3·00	7·75	3·50	...	210·4	7·0	2·0	16	3·55	3·46
47·4	·340	3·8	1·1	79·7	537·2	69·75	83·50	96·00	99·75	16·00	...	...	7·0	3·5	191	35·47	33·17

Long. 1° 5′ W. Height above Sea 20 feet.

																	*
34·2	·197	2·3	0·4	87·9	553·7	9·50	4·50	5·75	10·25	1·00	...	208·6	5·5	1·8	13	2·62	2·60
41·9	·266	3·1	0·6	82·7	550·1	2·50	5·00	5·75	12·75	2·00	...	179·8	6·7	0·9	13	1·82	1·80
35·1	·206	2·4	0·6	81·5	551·9	9·75	12·50	3·25	5·50	0·00	...	232·7	6·8	2·9	12	2·12	2·10
44·9	·299	3·4	1·2	74·9	538·9	2·25	2·25	8·50	17·00	0·00	...	218·2	6·0	1·1	17	1·33	1·32
46·5	·317	3·6	1·6	67·6	534·9	3·50	13·25	7·50	6·75	0·00	...	154·3	5·3	3·9	10	1·54	1·52
49·9	·358	4·0	2·6	60·2	531·8	8·00	6·00	5·00	10·50	0·50	...	121·7	4·5	3·6	4	1·51	1·50
52·5	·396	4·4	2·2	65·8	527·6	5·00	4·50	9·50	12·00	0·00	...	151·1	5·8	3·7	14	3·34	3·16
55·6	·443	4·9	2·0	70·5	527·6	2·25	4·50	11·50	10·75	2·00	...	127·6	5·0	2·1	9	2·12	2·07
51·6	·384	4·2	2·1	68·1	532·7	5·75	5·00	6·50	12·75	0·00	...	159·0	5·1	2·2	10	1·90	1·85
45·8	·308	3·5	1·1	75·6	539·7	8·00	3·75	7·00	10·75	1·50	...	130·5	6·3	1·1	21	2·55	2·41
38·4	·233	2·7	0·7	78·4	556·4	11·00	8·25	1·50	7·25	2·00	...	132·2	6 0	1·1	6	0·51	0·48
36·2	·213	2·5	0·5	85·3	556·8	7·75	3·75	2·75	12·75	4·00	...	149·5	6·1	0·9	9	1·00	0·89
44·4	·302	3·4	1·3	74·9	541·8	75·25	73·25	74·50	129·00	13·00	...	163·8	5·8	2·1	138	22·36	21·71

* 20 feet above the ground.

Appendix

Winchester. Lat. 51° 15′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	...	...	...	55·0	5·0	50·0	40·9	26·9	14·0	33·9	...	...	36·3	34·8
February	...	...	...	56·0	26·0	30·0	51·4	37·2	14·2	44·3	...	...	46·9	44·1
March	...	...	..	58·0	24·0	34·0	45·4	31·8	13·6	38·6	...	...	40·7	37·7
April	...	...	.	65·0	28·5	36·5	58·7	41·3	17·4	50·0	...	...	53·3	48·5
May	...	...	..	82·0	28·0	54·0	63·6	42·0	21·6	52·8	...	...	58·1	52·1
June	...	...	...	82·0	36·5	45·5	72·0	46·4	25·6	59 2	...	...	65·2	57·2
July	...	...	...	81·0	40·0	41·0	72·3	47·4	24·9	59·8	...	...	65·4	58·8
August	...	.	...	88·0	40·0	48·0	72·5	49·3	23·2	60·9	...	...	66·6	60·0
September	..	...	...	82·0	32·5	49·5	68·6	45·4	23·2	57·0	...	...	61·9	56·5
October...	...	..	...	68·0	28·0	40·0	58·5	35·7	22·8	47·1	...	...	51·9	49·5
November	...	...	...	62·0	20·0	42·0	50·5	30·3	20·2	40·4	...	...	42·9	41·2
December	...	...	...	56·0	11·0	45·0	44·3	28·5	15·8	36·4	...	...	39·3	37·9
Yearly Sums, Means, and Totals ...	...	...	..	69·6	26·6	43·0	58·2	38·5	19·7	48·4	...	...	52·4	48·2

Parkhurst, Isle of Wight. Lat. 50° 43′ N.

January	...	...	...	53·6	11·0	42·6	44·6	28·6	16·0	36·6	49·9	20·5	38·8	36·3
February	...	...	...	57·0	31·0	26·0	51·3	39·3	12·0	45·3	67·2	32·1	47·1	45·3
March	...	...	...	56·6	27·0	29·6	45·2	32·6	12·6	38·9	62·2	26·6	41·2	38·8
April	...	...	...	66·0	30·0	36·0	57·4	41·7	15·7	49·6	92·0	35·1	53·1	49·6
May	...	...	...	81·0	33·0	48·0	63·9	43·2	20·7	53·5	110·6	37·8	67·8	63·9
June	...	...	...	79·0	39·0	40·0	70·2	46·6	23·6	58·4	121·4	38·6	64·5	60·6
July	...	...	...	80·0	42·0	38·0	69·8	50·1	19·7	59·9	122·6	42·9	64·8	60·1
August	...	...	...	84·0	44·4	40·0	71·6	51·0	20·6	61·3	112·0	43·7	64·6	61·1
September	...	...	...	81·0	34·0	47·0	67·2	48·7	18·5	57·9	103·4	40·2	61·1	57·8
October...	...	..	...	63·0	30·0	33·0	58·6	41·8	16·8	50·2	72·8	31·6	53·7	51·1
November	...	...	...	62·0	23·0	39·0	49·9	39·4	10·5	44·6	84·4	25·3	45·1	43·4
December	...	...	...	56·0	20·0	38·0	44·5	31·2	13·3	37·8	46·7	22·2	40·4	38·1
Yearly Sums, Means, and Totals ...	...	...	...	68·4	30·3	38·1	57·8	41·2	16·6	49·5	84·6	33·0	53·5	50·5

Netley. Lat. 50° 51′ N.

January	29·625	30·375	28·750	54·4	6·6	47·8	40·3	26·7	13·9	33·6	59·2	26·2	36·4	35·4
February	30·018	30·377	29·915	62·0	40·0	22·0	51·2	41·8	9·4	46·5	68·4	37·8	46·7	45·0
March	29·715	30·688	29·146	56·0	27·5	28·5	44·8	34·4	10·4	39·6	73·8	29·9	40·5	38·3
April	29·929	30·410	29·120	64·2	29·0	35·2	57·9	44·2	13·7	51·0	96·4	33·9	52·3	48·1
May	29·824	30·092	29·311	81·6	28·8	52·8	62·9	44·8	18·1	53·8	100·6	40·3	57·4	52·6
June	30·046	30·496	29·467	81·2	39·0	42·2	69·3	48·5	20·8	58·9	111·1	43·9	63·4	58·9
July	29·848	30·243	29·404	77·0	56·8	20·2	69·8	51·7	18·1	60·7	113·2	47·9	64·0	57·6
August	29·937	30·152	29·672	83·5	45·0	38·5	72·3	53·7	18·6	63·0	107·5	50·4	64·6	60·0
September	30·026	30·458	29·710	80·0	34·0	46·0	67·5	50·9	16·6	59·2	100·5	47·2	61·1	57·1
October...	29·874	30·397	29·413	63·0	29·5	33·5	57·5	43·3	14·2	50·4	86·6	39·6	52·4	49·8
November	30·210	30·589	29·487	63·0	21·2	41·8	49·4	34·4	15·0	41·9	74·7	30·6	43·8	41·7
December	29·971	30·382	29·888	55·5	17·8	37·7	44·4	32·1	12·3	38·2	64·4	29·5	39·3	37·9
Yearly Sums, Means, and Totals ...	29·919	30·388	29·357	68·5	31·3	37·2	57·3	42·2	15·1	49·7	86·0	33·4	51·6	49·2

No. XXII—*continued.*

Long. 1° 20′ W. Height above Sea 214 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
32·6	·196	2·1	0·4	87·1	...	7·75	5·75	7·25	10·25	0·00	...	...	7·6	2·5	12	3·23	...
40·9	·256	2·9	0·7	80·4	...	3·00	4·50	8·76	11·75	0·00	...	...	7·2	2·6	18	2·47	...
33·9	·195	2·3	0·7	77·4	...	13·25	9·25	4·00	4·50	0·00	...	...	7·7	2·2	14	3·42	...
43·7	·285	3·2	1·3	70·0	...	3·00	2·25	11·25	13·50	0·00	...	...	7·1	3·4	21	2·65	...
46·7	·319	3·6	1·8	66·1	...	6·00	9·25	9·25	6·50	0·00	...	...	6·7	3·2	12	1·57	...
50·6	·369	4·0	2·8	59·0	...	14·00	0·75	5·25	9·00	1·00	...	...	5·9	3·2	10	1·37	...
53·4	·408	4·5	2·4	65·4	...	5·25	5·50	8·50	11·75	0·00	...	...	6·2	3·8	15	4·73	...
54·7	·428	4·7	2·4	65·6	...	3·50	2·25	13·25	12·00	0·00	...	...	6·2	2·9	12	2·25	...
51·9	·386	4·3	1·9	70·0	...	5·50	3·25	8·25	13·00	0·00	...	...	6·8	3·0	14	3·28	...
47·1	·324	3·6	0·7	84·1	...	8·25	4·00	7·50	11·25	0·00	...	...	6·5	1·8	22	3·07	...
39·1	·239	2·8	0·4	86·4	...	15·25	8·50	1·25	5·00	0·00	...	...	5·3	1·3	6	0·02	...
36·1	·213	2·4	0·4	88·8	...	13·75	3·75	3·25	10·25	0·00	...	...	6·5	2·9	7	1·12	...
44·2	·301	3·4	1·3	75·0	...	98·50	59·00	87·75	118·75	1·00	...	...	6·6	2·7	163	29·18	...

Long. 1° 16′ W. Height above Sea 200 feet.

32·9	·188	2·2	0·6	80·6	...	10·00	4·50	4·00	11·50	1·00	...	...	7·6	...	13	2·88	...
43·3	·281	3·2	0·5	87·5	...	4·50	3·50	6·00	13·00	1·00	...	...	7·5	...	16	2·79	...
35·6	·210	2·4	0·6	81·6	...	8·50	14·00	3·00	4·50	1·00	...	...	7·1	...	14	3·43	...
46·1	·312	3·5	1·0	77·1	...	5·50	2·50	7·50	14·50	0·00	...	...	6·7	...	11	1·59	...
60·8	·534	5·8	1·6	78·5	...	3·50	9·00	9·50	7·00	2·00	...	...	6·6	...	8	2·43	...
57·2	·469	5·1	1·5	77·0	...	8·00	10·00	5·00	7·00	0·00	...	...	5·1	...	4	2·11	...
56·2	·459	5·0	1·8	73·5	...	6·00	5·50	10·50	9·00	0·00	...	...	6·7	...	14	4·11	...
58·2	·487	5·3	1·4	79·6	...	1·50	4·00	12·00	13·50	0·00	...	...	6·2	...	7	2·82	...
54·9	·432	4·8	1·2	80·5	...	3·50	4·00	9·50	11·00	2·00	...	...	6·2	...	8	1·91	...
45·6	·341	3·8	0·8	82·5	...	3·50	4·50	10·50	12·50	0·00	...	...	7·2	...	20	3·93	...
39·3	·240	2·8	0·6	80·2	...	5·00	9·50	7·00	5·50	3·00	...	...	6·2	...	8	0·93	...
37·4	·224	2·6	0·3	89·6	...	10·50	4·50	2·00	12·00	2·00	...	...	6·6	...	7	1·48	...
47·6	·348	3·9	1·0	80·7	...	70·00	75·50	86·50	121·00	12·00	...	...	6·6	...	130	30·46	...

Long. 1° 20′ W. Height above Sea 47 feet.

																	*
34·0	·196	2·3	0·3	91·4	553·3	11·25	5·00	5·75	9·00	0·00	...	303·1	7·4	4·7	13	3·35	2·06
43·1	·279	3·2	0·5	88·1	548·7	3·75	4·25	7·50	12·50	0·00	...	239·2	7·0	4·2	16	1·98	1·35
35·5	·208	2·4	0·6	82·9	550·4	8·50	13·00	4·25	5·25	0·00	...	297·4	8·1	4·3	14	2·20	1·32
43·8	·286	3·3	1·1	73·1	541·0	0·75	2·00	8·25	19·00	0·00	...	377·1	8·5	5·6	17	1·75	1·11
48·2	·338	3·8	1·5	71·4	533·5	4·75	8·50	13·00	4·75	0·00	...	202·9	8·1	4·5	15	1·35	1·22
51·4	·380	4·2	2·2	65·0	531·0	10·25	2·50	5·75	11·50	0·00	...	101·1	6·6	3·1	7	1·61	1·33
52·6	·397	4·4	2·2	66·2	526·7	5·25	3·00	10·50	12·25	0·00	...	267·4	7·5	5·0	15	3·96	3·09
56·2	·453	5·0	1·7	74·0	527·4	2·50	2·50	12·00	14·00	0·00	...	202·4	7·2	4·8	9	2·21	1·82
53·6	·412	4·6	1·4	77·0	532·8	7·50	2·50	7·50	12·50	0·00	...	257·9	7·2	5·6	11	2·23	1·90
47·2	·325	3·7	0·8	82·8	539·8	6·75	3·00	8·50	10·75	0·00	...	228·5	7·6	4·3	19	2·93	2·20
39·2	·241	2·7	0·5	84·0	556·7	14·75	6·25	3·75	4·75	0·50	...	178·3	7·0	3·8	6	0·42	0·26
36·1	·213	2·4	0.4	88·8	556·5	13·25	3·50	2·75	11·00	0·50	...	269·1	7·8	3·0	11	1·27	0·83
45·1	·311	3·5	1·1	78·7	541 4	91·25	56·00	89·50	127·25	1·9	...	243·7	7·5	4·4	153	25·28	19·20

* 28 feet above the ground.

Appendix

DOVER. Lat. 51° 8′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	...	...	...	52·0	16·0	36·0	40·6	27·2	13·4	33·9	...	...	36·4	35·0
February	...	...	...	55·0	29·0	26·0	49·3	36·4	12·9	42·8	...	...	45·5	43·4
March	...	...	...	53·0	23·5	29·5	43·5	30·8	12·7	37·1	...	...	39·6	37·5
April	...	...	...	59·5	32·0	27·5	54·9	39·6	15·3	47·2	...	...	50·4	47·6
May	...	...	...	75·5	29·0	46·5	60·9	43·0	17·9	51·9	...	...	55·5	51·5
June	...	...	...	74·0	42·0	32·0	65·6	47·8	17·8	56·7	...	...	60·3	56·3
July	...	...	...	74·5	43·5	31·0	66·5	49·2	17·3	57·8	...	...	61·5	57·3
August	...	...	...	83·5	45·0	38·5	70·0	53·5	16·5	61·7	...	...	65·6	60·8
September	...	...	...	77·0	38·5	38·5	66·3	49·3	17·0	57·8	...	...	61·6	58·1
October...	...	...	...	66·0	29·5	35·5	57·3	41·6	15·7	49·4	...	...	52·6	49·5
November	...	...	...	62·0	29·5	32·5	48·7	35·6	13·1	42·1	...	...	44·6	42·2
December	...	...	...	54·5	21·0	33·5	43·3	30·1	13·2	36·7	...	...	38·8	37·2
Yearly Sums, Means, and Totals ...	...	...	...	65·5	31·5	33·9	55·6	40·3	15·2	47·9	...	...	51·0	48·0

SHORNCLIFFE CAMP. Lat. 51° 5′ N.

January	29·071	30·268	28·865	56·2	12·9	43·3	42·3	25·9	16·4	34·1	50·7	22·9	35·5	34·0
February	30·014	30·598	28·893	55.4	27·9	27·5	50·2	36·1	14·1	43·1	67·2	32·3	45·0	43·5
March	29·099	30·733	29·176	52·8	20·0	32·8	43·7	29·9	13·8	36·8	68·8	27·9	39·0	37·1
April	29·747	30·451	29·247	60·3	29·4	30·9	55·5	38·3	17·2	46·9	96·2	34·2	49·2	47·2
May	29·543	30·062	29·272	75·6	28·0	47·6	61·5	42·7	18·8	52·1	109·0	37·5	55·3	51·6
June	29·961	30·376	29·535	75·2	40·2	35·0	66·6	42·6	24·0	54·6	119·6	39·3	60·0	56·8
July	29·766	30·175	29·414	74·2	41·0	33·2	68·2	48·0	20·2	58·1	123·0	38·8	61·7	58·8
August	29·841	30·078	29·562	86·6	44·8	41·8	72·0	52·0	20·0	62·0	127·9	44·7	65·6	61·3
September	29·930	30·344	29·600	79·8	35·4	44·4	67·4	48·0	19·4	57·7	114·1	43·3	61·1	58·1
October...	29·760	30·285	29·263	67·5	26·8	40·7	58·7	38·4	20·3	48·5	91·9	34·6	51·8	49·4
November	30·124	30·514	29·333	62·6	28·2	34·4	50·1	33·6	16·5	41·8	60·7	30·3	43·8	41·1
December	30·038	31·077	29·393	58·8	20·2	38·6	46·8	28·5	18·3	37·6	52·1	27·4	41·2	38·8
Yearly Sums, Means, and Totals ...	29·791	30·413	29·296	67·1	29·6	37·5	56·9	38·7	18·2	47·8	90·1	34·4	50·8	48·1

CANTERBURY. Lat. 51° 17′ N.

January	...	...	...	56·5	9·5	47·0	41·5	27·1	14·4	34·3	...	...	37·3	37·0
February	...	...	...	60·0	30·0	30·0	52·6	37·4	15·2	45·0	...	...	47·4	46·1
March	...	...	...	60·0	19·0	41·0	46·7	31·2	15·5	38·9	...	...	42·0	40·9
April	...	...	...	64·5	30·0	34·5	59·6	40·9	18·7	50·2	...	...	53·3	51·8
May	...	...	...	88·5	35·5	50·0	66·3	40·6	25·7	53·4	...	...	60·3	55·8
June	...	...	...	85·0	37·5	47·5	71·3	46·3	25·0	58·8	...	...	64·3	62·1
July	...	...	...	81·5	36·0	45·5	72·6	47·4	25·2	60·0	...	...	66·0	63·8
August...	...	...	...	91·5	40·0	51·5	77·0	49·2	27·8	63·1	...	...	70·6	67·7
September	...	...	. .	81·0	36·5	44·5	69·5	46·4	23·1	57·9	...	...	64·0	62·3
October	...	...	...	72·5	30·0	42·5	59·9	38·5	21·4	48·2	...	...	54·3	53·1
November	...	...	...	65·5	21·0	44·5	51·1	33·1	18·0	42·1	...	..	46·5	45·4
December	...	...	...	57·0	17·5	39·5	44·1	32·5	11·6	38·3	...	...	40·3	39·2
Yearly Sums, Means, and Totals ...	...	...	...	72·0	28·8	43·2	59·3	39·2	20·1	49·2	...	...	53·9	52·1

No. XXII—*continued.*

Long. 1° 19′ E. Height above Sea 325 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
33·0	·189	2·2	0·4	87·8	...	9·50	4·50	6·25	10·75	0·00	...	...	...	5·1	12	1·99	...
41·0	·258	2·9	0·6	84·8	...	4·75	4·50	4·50	14·25	0·00	...	...	...	5·5	16	1·20	...
34·8	·202	2·3	0·5	83·2	...	6·25	14·75	4·50	5·50	0·00	...	...	...	6·4	20	2·68	...
44·6	·296	3·4	0·7	81·2	...	5·75	2·25	5·75	16·25	0·00	...	...	...	5·6	19	1·30	...
47·7	·333	3·7	1·2	74·5	...	6·50	10·25	5·00	5·75	3·50	...	...	...	6·6	17	3·32	...
52·8	·400	4·4	1·4	76·3	...	9·75	6·75	4·25	8·75	0·50	...	...	...	6·3	6	1·28	...
53·6	·412	4·6	1·5	76·0	...	5·50	3·50	8·25	13·75	0·00	...	...	...	5·7	18	3·29	...
56·8	·465	5·1	1·7	74·0	...	3·25	3·50	10·25	12·50	1·50	...	...	...	5·3	8	0·71	...
55·1	·434	4·8	1·3	79.6	...	7·50	4·50	6·25	11·25	0·50	...	...	...	6·2	14	1·24	...
46·4	·316	3·6	0·9	80·0	...	8·25	2·00	8·25	12·50	0·00	...	...	...	5·9	19	2·22	...
39·4	·241	2·8	0·6	82·0	...	12·00	6·00	4·25	7·75	0·00	...	...	...	5·6	11	1·62	...
35·0	·205	2·4	0·4	87·2	...	15·00	3·50	3·50	9·00	0·00	...	...	3·6	5·0	18	3·09	...
45·0	·313	3·5	0·9	80·5	...	94·00	66·00	71·00	128·00	6·00	...	...	...	5·8	178	23·94	...

Long. 1° 10′ E. Height above Sea 220 feet.

																	*
31·7	·180	2·1	0·4	86·0	555·3	6·50	5·50	6·50	12·50	0·00	...	482·9	6 0	6·7	13	2·19	1·56
41·7	·264	3·0	0·4	88·5	550·6	3·50	3·75	8·00	12·25	0·50	...	327·2	5·4	6·3	11	1·12	0·80
34·6	·201	2·3	0·5	81·8	551·8	9·00	12·75	3·25	6·00	0·00	...	387·1	7·2	6·4	12	2·68	1·91
45·0	·300	3·4	0·6	86·2	540·9	4·00	2·00	5·25	18·25	0·50	...	444·5	6·6	6·5	15	1·80	1·19
48·0	·337	3·8	1·1	77 1	540·6	4·25	12·50	6·75	7·50	0·00	...	...	5·2	4·8	16	3·62	3·12
54·0	·417	4·6	1·2	80·8	532·8	8·75	7·00	5·25	9·00	0·00	...	...	6·4	5·6	6	0·77	0·54
56·3	·456	5·0	1·2	83·3	527·3	2·25	7·00	5·25	16·50	0·00	...	...	6·6	5 4	17	3·85	3·20
57·7	·480	5·3	1·6	76·5	524·6	2·00	7·75	5·00	16·25	0·00	...	...	6·0	5·6	7	1·16	0·92
55·5	·441	4·9	1·1	82·1	530·9	5·25	4·75	7·25	12·75	0·00	...	...	6·4	5·7	11	0·86	0·76
47·0	·323	3·6	0·7	84·0	538·4	5·25	3·25	6·25	16·25	0·00	...	...	6·4	5·2	19	2·72	2·10
37·9	·228	2·6	0·6	79·2	554·1	9·50	4·50	4·50	11·50	0·00	...	...	6·4	5·4	5	0·99	0·81
35·8	·210	2·4	0·6	81·6	555·6	11·75	5·50	2·00	11·75	0·00	...	...	7·6	4·6	12	2·61	1·33
45·4	·320	3·6	0·8	82·5	541·1	72·00	76·25	65·25	150·50	1·00	..	...	6·3	5·7	144	24·37	18·24

Long. 1° 5′ E. Height above Sea 80 feet.

36·6	·216	2·6	0·1	97·3	...	3·00	2·50	11·00	12·50	2·00	...	...	5·6	2·8	10	1·32	...
44·7	·295	3·3	0·4	90·9	...	2·00	3·50	8·00	9·50	5·00	...	...	5·3	2·9	11	1·29	...
39·6	·243	2·8	0·3	91·3	...	15 00	3·50	4·50	7·00	1·00	...	...	5·4	3·5	9	1·87	...
50·3	·364	4·1	0·4	89·8	...	4·00	1·00	6·00	19·00	0·00	...	...	5·1	3·1	11	0·85	...
51·9	·386	4·3	1·5	73·5	...	4·50	10·00	6·00	3·50	7·00	...	...	3·9	3·2	10	3·36	...
60·2	·524	5·8	0·9	87·1	...	9·00	3·50	3·50	9·00	5·00	...	...	3·3	2·8	6	1·11	...
62·0	·557	6·1	0·9	87·0	...	3·50	3·00	6·00	9·50	9·00	...	...	3·3	3·1	15	2·42	...
65·5	·629	6·8	1·3	83·5	...	2·00	0·00	7·00	11·00	11·00	...	...	2·4	2·5	6	0·60	...
60·9	·535	5·9	0·7	89·8	...	4·50	2·00	5·50	15·00	3·00	...	...	3·9	2·6	10	1·77	...
51·9	·387	4·4	0·4	91·6	...	6·50	0·00	7·00	12·50	5·00	...	...	3·5	2·3	12	2·10	...
44·2	·291	3·3	0·3	92 3	...	15·00	2·00	4·00	3·00	6·00	...	...	4·2	4·1	5	1·78	...
37·6	·227	2·6	0·3	91·2	...	9·00	4·50	4·00	10·50	3·00	...	...	4·7	2·5	8	1·32	...
50·5	·388	4·3	0·6	88·8	...	78·00	35·50	72·50	122·00	57·00	...	...	4·2	2·9	113	19·79	...

* 20 feet above the ground.

Appendix

FORT PITT, CHATHAM. Lat. 51° 23′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·547	30·102	28·650	55·2	8·7	46·5	40·8	26·4	14·4	33·6	52·8	24·7	36·2	35·2
February	29·945	30·437	28·731	56·8	31·4	25·4	51·1	37·9	13·2	44·5	71·4	34·5	46·6	44·3
March	29·652	30·605	29·010	58·6	21·9	36·7	44·5	31·7	12·8	38·1	72·0	28·6	40·6	38·5
April	29·633	30·325	29·097	64·1	30·2	33·9	57·4	41·1	16·3	49·2	87·9	37·0	52·3	49·2
May	29·755	30·007	29·232	84·0	29·2	54·8	64·5	43·0	21·5	53·7	100·7	38·0	58·0	53·8
June	29·947	30·396	29·566	86·2	39·2	47·0	72·8	47·6	25·2	60·2	110·9	43·3	64·6	59·3
July	29·743	30·155	29·419	82·8	41·5	41·3	73·5	49·2	24·3	61·3	112·3	45·4	64·7	60·9
August	29·85	30·081	29 507	88·4	43·9	44·5	75·3	51·8	23·5	63·5	115·5	47·1	67·9	63·0
September	29·922	30·357	29·662	79·8	37·2	42·6	69·7	49·2	20·5	59·4	102·4	44·4	63·4	58·4
October	29·760	30·307	29·410	68·2	29·4	38·8	58·9	40·6	18·3	49·7	84·4	36·0	53·9	50·8
November	30·143	30·530	29·483	63·2	23·9	39·3	49·6	34·8	14·8	42·2	66·0	31·0	44·9	42·0
December	29·886	30·250	28·799	57·2	19·1	38·1	43·3	30·2	13·1	36·7	53·0	27·1	39·3	38·0
Yearly Sums, Means, and Totals ...	29·816	30·296	29·297	70·4	29·6	40·7	58·4	40·3	18·2	49·3	86·8	36·4	52·7	49·5

SHEERNESS. Lat. 51° 23′ N.

January	...	...	...	55·0	9·0	46·0	41·8	25·4	16·4	33·6	...	...	36·7	35·2
February	...	...	...	59·0	30·0	29·0	50·6	37·4	13·2	44·0	...	...	46·5	44·2
March	...	...	...	59·0	22·0	37·0	44·4	36·7	7·7	40·5	...	...	41·3	38·7
April	..	...	...	65·0	44·0	21·0	57·8	50·1	7·7	53·9	...	...	52·1	49·9
May	...	...	...	83·0	57·0	26·0	64·2	53·5	10·7	58·8	...	...	58·3	53·1
June	...	...	...	84·0	52·0	32·0	72·0	62·0	10·0	67·0	...	...	65·4	59·8
July	...	...	...	76·0	54·0	22·0	71·3	62·7	8·6	67·0	...	...	66·0	62·3
August	...	...	...	87·0	54·0	33·0	77·4	64·2	13·2	70·8	...	...	70·4	63·5
September	...	...	...	74·8	50·6	24·2	68·8	59·1	9·7	63·9	...	...	63·6	59·8
October	...	...	...	68·3	41·0	27·3	59·9	50·5	9·4	55·2	...	..	53·8	51·4
November	...	...	...	65·0	28·0	37·0	52·1	42·3	9·8	47·2	...	...	44·8	42·9
December	...	...	...	57·0	23·0	34·0	46·5	33·8	12·7	40·1	...	...	38·9	37·6
Yearly Sums, Means, and Totals ...	...	...	...	69·4	38·7	30·7	58·9	48·1	10·8	53·5	...	...	53·1	49·9

WOOLWICH. Lat. 51° 29′ N.

January	28·965	29·315	28·125	56·3	3·7	52·6	45·4	24·8	20·6	35·1	46·9	23·9	38·2	35·6
February	29·362	29·670	29·217	57·3	28·0	29·3	54·4	37·9	16·5	46·1	67·7	35·2	46·2	44·0
March	29·247	29·810	28·462	57·2	12·0	45·2	51·7	28·8	22·9	40·2	80·3	23·7	40·1	37·7
April	29·030	29·622	28·623	63·3	22·1	41·2	59·9	39·4	20·5	49·6	93·3	36·1	51·6	48·2
May	29·126	29·430	28·795	84·1	26·9	57·2	70·1	41·8	28·3	55·9	109·7	47·1	59·5	54·7
June	29·163	29·615	28·990	78·2	35·3	42·9	72·7	46·5	26·2	59·6	121·6	43·7	62·3	57·9
July	29·112	29·576	28·995	79·2	38·5	40·7	72·5	47·9	24·6	60·2	120·3	41·7	64·8	59·5
August	29·197	29·390	28·989	89·0	35·3	53·7	74·1	50·9	23·2	62·5	111·9	48·3	67·3	62·2
September	29·280	29·612	29·022	77·3	30·0	47·3	68·0	47·4	20·6	57·7	102·8	43·9	62·0	58·4
October...	29·128	29·569	28·579	66·3	25·0	41·3	62·5	38·6	23·9	50·5	79·8	36·6	53·2	51·1
November	29·450	29·715	28·819	63·3	22·3	41·0	56·9	33·2	23·7	45·0	54·1	31·3	47·7	45·2
December	29·660	30·106	28·575	58·3	11·5	46·8	43·1	27·7	15·4	35·4	44·6	27·1	39·2	38·0
Yearly Sums, Means, and Totals ...	29·227	29·619	28·766	69·1	24·2	44·9	60·9	38·7	22·2	49·8	86·1	36·5	53·7	49·4

No. XXII—*continued.*

Long. 0° 32′ W. Height above Sea 160 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
33·7	·194	2·2	0·3	91·2	552·0	8·75	3·25	9·25	6·75	3·00	...	235·0	8·0	1·1	21	4·30	...
41·7	·264	3·0	0·6	83·9	547·8	1·00	4·75	14·50	6·25	1·50	...	386·4	7·4	1·7	15	1·59	...
35·8	·210	2·4	0·5	83·8	549·1	6·75	14·25	4·25	5·25	0·50	...	242·4	8·6	1·5	22	3·58	...
46·2	·314	3·6	0·9	80·3	535·7	1·50	3·25	8·00	17·25	0·00	...	302·0	7·6	2·2	26	2·09	...
50·0	·362	4·0	1·4	75·0	531·5	5·75	10·00	12·50	2·75	0·00	...	209·5	6·4	1·5	18	2·50	...
54·9	·432	4·8	1·9	71·1	527·7	7·00	9·00	3·00	10·00	1·00	...	153·0	5·2	1·4	12	1·59	...
57·8	·479	5·2	1·5	78·0	523·9	2·00	5·75	8·25	14·50	0·50	...	192·0	6·0	2·6	17	5·97	...
59·2	·502	5·4	2·0	73·5	522·4	1·75	3·75	10·25	13·25	2·00	...	120·6	5·9	2·4	8	1·78	...
54·2	·421	4·7	1·8	72·4	528·8	3·25	3·50	8·50	14·75	0·00	...	226·2	6·4	2·6	14	1·27	...
47·8	·331	3·7	0·9	79·4	536·1	3·25	4·25	19·00	4·50	0·00	...	201·1	6·9	1·6	17	2·05	...
38·6	·234	2·7	0·7	78·6	533·3	8·50	3·00	4·50	14·00	0·00	...	152·8	7·2	1·0	8	0·73	...
36·3	·215	2·5	0·3	89·6	554·9	6·25	4·25	4·75	15·75	0·00	...	206·2	9·4	1·3	21	2·45	...
64·3	·330	3·7	1·1	79·7	538·6	55·75	69·00	106·75	125·00	8·50	...	219·8	7·1	1·7	199	29·90	...

Long. 0° 49′ E. Below Sea 2 feet.

33·1	·189	2·2	0·4	87·2	...	10·50	4·00	5·00	11·50	0·00	...	...	7·1	4·8	9	1·23	...
41·6	·263	3·0	0·6	83·9	...	2·25	4·25	5·50	16·00	0·00	...	...	5·5	6·0	11	0·89	...
35·5	·207	2·4	0·6	80·4	...	5·75	16·00	3·50	5·75	0·00	...	...	5·7	5·9	11	1·76	...
47·7	·331	3·7	0·7	84·9	...	5·75	2·50	3·00	13·75	0·00	...	...	3·6	4·9	13	1·22	...
48·8	·346	3·8	1·6	71·0	...	6·75	11·00	8·25	5·00	0·00	...	...	3·8	5·0	7	2·51	...
55·2	·437	4·8	2·1	70·4	...	6.75	7·75	5·75	9·75	0·00	...	...	3·5	4·4	7	1·67	...
59·3	·506	5·6	1·4	79·5	...	3·50	7·25	7·75	12·50	0·00	...	...	3·8	4·6	16	4·83	...
58·2	·487	5·3	2·8	65·4	...	8·00	10·00	6·00	7·00	0·00	...	...	3·6	4·3	7	1·67	...
56·6	·460	5·1	1·4	78·6	...	7·50	3·25	8·50	8·75	2·00	...	...	4·1	1·4	9	0·36	...
49·1	·347	3·9	0·7	84·0	...	5·50	2·75	10·50	12·25	0·00	...	...	4·6	2·8	7	0·91	...
40·7	·254	2·9	0·5	86·4	...	12·25	3·75	4·00	10·00	0·00	...	...	3·5	2·3	6	0·23	...
35·9	·212	2·5	0·3	90·1	...	10·00	3·75	6·75	10·50	0·00	...	...	6·1	2·0	7	0·62	...
46·8	·337	3·8	1·1	80·1	...	80·50	76·25	79·50	122·75	2·00	...	...	4·6	4·0	110	17·90	...

Long. 0° 4′ E. Height above Sea 145 feet.

																	*
32·1	·181	2·1	0·6	78·6	557·8	12·00	4·25	5·75	8·50	0·50	...	119·4	3·4	1·6	13	1·89	1·69
41·5	·263	3·1	0·5	84·6	537·4	0·50	4·50	4·25	17·25	0·50	...	146·6	5·3	3·1	16	1·25	0·99
34·6	·201	2·3	0·6	81·0	542·1	10·25	12·00	3·25	5·50	0·00	...	133·7	5·5	2·9	13	2·31	2·06
44·6	·295	3·3	1·0	76·4	525·3	3·25	3·25	5·25	17·25	1·00	...	128·9	5·6	4·0	23	1·89	1·57
50·4	·367	4·1	1·6	72·0	518·8	4·25	9·75	5·50	11·50	0·00	...	104·3	5·1	2·2	11	2·21	1·96
54·2	·420	4·6	1·7	74·0	516·2	8·75	2·50	2·75	17·00	0·00	...	102·2	4·3	3·1	9	1·63	1·47
58·2	·486	5·3	2·0	73·5	510·5	3·50	7·50	11·75	6·25	2·00	...	96·9	5·4	2·8	16	5·13	4·81
56·1	·485	5·3	2·1	72·5	511·6	1·00	1·25	4·75	24·00	0·00	...	88·3	4·2	4·2	11	3·99	2·70
55·3	·438	4·8	1·3	79·0	518·5	2·75	0·00	1·00	26·25	0·00	...	106·2	4·8	3·0	10	1·70	1·68
50·0	·361	4·0	0·5	89·0	525·2	4·74	0·00	6·50	19·75	0·00	...	102·8	5·5	3·1	14	1·89	1·81
42·4	·271	3·1	0·7	83·2	537·3	15·0	4·25	2·75	8·00	0·00	...	98·9	4·1	1·3	3	0·27	0·22
36·4	·216	2·5	0·3	90·4	550·9	12·00	0·75	5·00	13·25	0·00	...	124·8	6·7	2·2	11	1·91	1·65
46·5	·332	3·7	1·1	79·5	529·3	78·00	50·00	58·50	174·50	4·00	...	112·7	5·0	2·8	150	25·07	22·61

* 20 feet above the ground.

Appendix

COLCHESTER. Lat. 51° 53′ N.

Month.	Readings of the Barometer.			Temperature of the Air.*							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean Of all the highest.	Mean Of all the lowest.	Mean Daily Range.	Mean Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
January	29·550	29·990	28·625	...	8·7	...	...	26·1	...	...	63·4	...	37·5	36·5
February ...	29·945	30·418	28·688	...	27·8	...	...	37·2	...	...	69·8	...	46·1	43·6
March	29·769	30·536	29·097	60·1	20·7	39·4	45·1	30·6	14·5	37·8	77·3	30·6	41·5	38·5
April	29·601	30·401	29·067	66·1	25·5	40·6	58·5	43·7	14·8	51·1	91·2	39·2	53·2	48·7
May	29·504	30·014	29·314	84·3	29·5	54·8	64·8	42·2	22·6	53·5	101·7	40·9	58·1	52·3
June	29·968	30·435	29·319	85·1	38·4	46·7	70·1	47·3	22·8	58·7	109·0	45·0	64·1	57·9
July†	...	...	...	...	...	...	...	...	...	...	...	...	...	...
August	29·763	29·970	29·458	88·8	40·2	48·6	75·5	51·4	24·1	63·4	113·7	47·1	70·1	61·6
September ...	29·854	30·282	29·549	83·5	36·5	47·0	69·2	48·9	20·3	59·0	103·3	44·3	62·9	58·7
October... ...	29·641	30·160	29·307	75·6	28·5	47·1	62·0	42·6	19·4	52·3	92·5	39·3	56·8	52·3
November ...	30·073	30·473	29·433	62·8	22·4	40·4	49·9	33·9	16·0	41·9	64·5	30·4	45·4	43·0
December ...	29·823	30·230	28·866	54·5	18·0	36·5	43·1	29·9	13·2	36·5	59·0	26·9	39·2	37·9
Yearly Sums, Means, and Totals ...	29·772	30·264	29·157	73·4	28·8	44·6	59·8	41·1	18·7	50·4	85·9	38·2	52·3	48·3

EDINBURGH CASTLE. Lat. 55° 7′ N.

January	29·131	29·741	28·188	54·0	17·0	37·0	38·4	25·2	13·2	31·8	45·0	24·5	33·1	32·3
February ...	29·355	30·035	28·058	56·0	25·5	29·5	47·3	34·2	13·1	40·7	62·4	33·1	42·9	40·6
March	29·371	30·357	28·340	55·0	21·0	34·0	42·0	28·8	13·2	35·4	63·7	27·3	37·7	35·7
April	29·108	29·698	28·329	59·5	32·0	27·5	53·1	37·3	15·8	45·2	77·9	36·7	48·2	45·9
May	29·481	29·845	28·986	67·0	31·0	36·0	53·2	37·9	15·3	45·5	80·6	37·5	47·6	44·5
June	29·570	30·206	29·005	75·0	34·0	41·0	64·5	42·0	22·5	53·2	100·0	41·3	57·5	52·7
July	29·368	29·885	28·808	80 0	41·0	39·0	63·7	47·1	16·6	55·4	92·7	44·1	57·8	54·3
August	29·389	29·693	29·078	77·0	44 0	33·0	65·7	51·1	14·6	58·4	92·5	47·2	61·0	56·5
September ...	29·462	30·136	29·080	68 0	41·0	27·0	60·7	47·6	13·1	54·1	89·5	43·0	56·0	52·0
October... ...	29·352	29·900	29·003	63·0	32·5	30·5	52·7	39·9	12·8	46·3	68·8	30·7	49·2	46·0
November ...	29·713	30·234	29·092	52·0	31·0	21·0	46·5	36·0	10·5	41·2	54·0	28·7	42·4	40·0
December ...	29·434	30·041	28·551	52·5	33·5	19·0	45·1	33·9	11·2	39·5	48·8	27·3	39·9	38·1
Yearly Sums, Means, and Totals ...	29·394	29·981	28·710	63·2	32·0	31·2	52·7	38·4	14·3	45·6	73·0	35·1	47·8	44·9

ABERDEEN. 57° 9′ N.

January	29·519	30·166	28·620	50·0	‡ ...	‡ ...	39·6	‡ ...	‡ ...	‡ ...	...	24·3	32·8	32·0
February ...	29·695	30·385	28·337	57·0	25·0	32·0	51·0	36·0	15·0	43·5	70·1	32·7	43·2	39·2
March	29·828	30·713	28·937	58·0	24·0	34·0	41·7	29·9	11·8	35·8	76·2	34·1	37·7	35·8
April	29·253	30·019	28·599	62·0	31·5	31·5	52·4	39·6	12·8	46·0	...	...	48·9	43·2
May	29·905	30·213	29·453	64·0	32·2	31·8	51·9	40·4	11·5	46·1	...	...	46·5	43·8
June	29·969	30·571	29·359	79·2	43·0	36·2	62·0	47·0	15·0	54·5	...	...	56·0	51·0
July	29·560	30·251	29·168	73·6	42·0	31·6	61·9	48·1	13·8	55·0	...	...	54·9	51·6
August... ...	29·800	30·074	29·370	74·0	44·5	29·5	67·0	49·9	17·1	58·4	...	...	59·2	52·9
September ...	29·845	30·423	29·448	69·0	40·0	29·0	61·8	47·2	14·6	54·5	...	...	54·7	51·3
October... ...	29·686	30·759	28 782	64·0	29·0	35·0	54·0	40·2	13·8	47·1	...	...	47·8	45·1
November ...	30·133	30·579	29·394	55·0	28·0	27·0	48·3	37·0	11·3	42·6	...	...	43·3	40·4
December ...	29·816	30·413	28·952	54·0	26·0	28·0	44·9	33·0	11·9	38·9	...	...	39·3	37·2
Yearly Sums, Means and Totals ...	29·759	30·380	29·034	64·6	33·2	31·4	54·3	40·8	13·5	47·5	...	...	46·8	43·6

* For nine months only.

† Not taken in consequence of the movement of troops.

‡ For eleven months only.

No. XXII—*continued.*

Long. 0° 54′ E. Height above Sea 109 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm. Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
35·1	·205	2·4	0·3	91·5	550·7	7·00	5·00	7·00	12·00	0·00	...	203·7	5·0	1·8	7	2·17	1·88
40·7	·255	3·0	0·6	82·6	548·2	3·50	2·50	7·50	14·50	0·00	...	219·3	7·5	2·5	11	1·36	1·27
34·8	·202	2·3	0·7	78·0	550·3	9·50	13·50	3·50	4·50	0·00	...	251·9	8·0	4·5	15	2·12	1·91
44·2	·290	3·3	1·2	71·5	534·2	3·50	1·50	10·50	14·50	0·00	...	...	8·0	5·5	16	1·60	1·51
47·1	·324	3·6	1·8	67·1	527·2	6·00	10·00	10·00	5·00	0·00	...	...	7·0	6·5	12	4·19	4·06
52·7	·399	4·4	2·2	66·2	528·7	11·00	6·50	4·00	8·50	0·00	...	...	6·5	7·0	10	1·71	1·64
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
55·0	·434	4·8	3·3	59·1	519·0	3·50	3·00	12·50	12·00	0·00	...	167·6	6·2	6·7	7	1·90	1·83
55·1	·435	4·9	1·5	76·0	527·8	6·00	3·00	9·00	12·00	0·00	...	203·7	7·0	6·1	10	1·20	1·15
48·1	·337	3·8	1·3	72·8	530·8	7·00	3·50	8·00	12·50	0·00	...	206·7	7·5	6·0	15	2·21	2·10
40·2	·249	2·9	0·6	82·6	551·4	7·50	3·50	6·50	12·50	0 00	...	157·3	7·0	1·5	4	0·22	0·16
36·2	·214	2·4	0·3	89·6	553·9	11·50	3·00	4·50	12·00	0·00	...	175·3	8·0	2·0	15	2·23	2·08
44·5	·304	3·4	1·2	76·1	538·4	76·00	55·00	83·00	120·00	0·00	...	...	7·1	4·6	122	20·96	19·59

Long. 3° 11′ W. Height above Sea 402 feet.

																	*
30·7	·172	2·0	0·2	91·1	548·0	9·00	8·50	6·00	6·50	1·00	...	250·7	7·0	2·4	9	1·60	1·45
37·9	·228	2·6	0·6	82·9	540·9	6·75	3·00	4·50	13·25	0·50	...	281·0	7·0	1·9	17	1·66	1·33
33·0	·188	2·2	0·5	83·7	547·1	7·25	10·50	7·75	5·00	0·50	...	372·0	6·7	·9	12	0·90	0·73
43·4	·281	3·2	0·6	84·1	530·5	8·25	2·50	5·00	13·25	1·00	...	282·5	8·2	2·9	20	2·84	2·67
41·1	·258	3·0	0·8	78·9	538·1	9·75	10·00	5·25	5·50	0·50	...	237·4	8·9	2·6	20	3·84	3·65
48·3	·339	3·8	1·5	71·5	529·0	11·50	4·25	3·25	9·50	1·50	...	190·4	7·8	1·8	12	3·08	2·91
51·1	·376	4·2	1·1	78·3	524·6	11·50	7·00	5·00	7·00	0·50	...	211·1	8·0	1·6	15	6·49	5·65
52·6	·396	4·4	1·6	74·5	521·6	7·50	3·75	5·00	13·75	1·00	...	163·1	7·5	2·1	14	2·03	1·89
46·2	·340	3·8	1·2	75·0	528·6	8·75	3·00	6·75	11·50	0·00	...	223·2	7·3	2·3	20	2·50	1·97
42·6	·274	3·1	0·9	77·8	534·0	12·00	3·75	4·25	10·50	0·50	...	198·8	6·8	1·2	15	1·65	1·41
37·0	·221	2·6	0·6	82·2	548·3	13·50	4·00	2·50	10·00	0·00	...	206·8	7·5	2·5	6	0·27	0·23
35·7	·210	2·4	0·4	85·6	545·8	12·50	3·00	4·25	11·25	0·00	...	245·8	6·8	3·1	16	1·45	1·29
41·8	·274	3·1	0·8	80·5	536·4	118·25	63·25	59·50	117·00	7·00	...	238·6	7·5	2·1	176	28·31	25·18

Long. 2° 6′ W. Height above Sea 61 feet.

																	†
30·4	·170	2·0	0·2	91·2	555·5	13·25	3·75	8·50	5·50	0·00	...	299·0	6·9	...	23	4·76	4·07
34·4	·199	2·3	0·9	71·2	547·2	3·00	1·75	12·50	10·75	0·00	...	225·0	4·7	...	13	1·43	1·13
33·2	·190	2·2	0·5	84·5	555·7	10·75	7·75	8·75	3·75	0·00	...	267·0	6·0	...	14	1·97	1·40
40·1	·249	2·8	0·7	81·0	537·7	5·75	3·50	11·50	9·25	0·00	...	180·0	6·2	...	19	3·04	2·85
40·7	·255	3·0	0·7	81·6	547·0	7·25	14·00	8·75	1·00	0·00	...	158·0	4·5	...	15	2·44	2·29
46·3	·317	3·5	1·5	70·0	537·7	6·50	6·00	10·25	7·25	0·00	...	575·0	3·5	...	11	1·39	1·27
48·4	·340	3·9	1·0	78·2	531·4	14·00	6·75	5·75	4·50	0·00	...	222·0	5·0	...	17	3·23	2·63
47·3	·326	3·7	2·0	64·7	531·3	6·25	4·50	15·00	5·25	0·00	...	147·0	6·0	...	18	3·47	3·23
48·0	·334	3·8	1·0	77·6	536·6	3·00	3·00	18·00	16·00	0·00	...	168·0	6·1	...	18	2·04	1·90
42·1	·268	3·1	0·7	81·9	541·6	4·50	4·25	11·75	10·50	0·00	...	184·0	7·0	...	18	1·82	1·29
36·9	·219	2·5	0·7	78·3	554·9	7·00	0·50	9·00	13·50	0·00	...	130·0	7·9	...	11	0·91	0·85
34·5	·200	2·3	0·5	83·2	553·6	6·25	0·25	12·50	12·00	0·00	...	143·0	7·5	...	16	2·12	2·02
40·2	·256	2·9	0·9	78·6	544·2	87·50	56·00	122·25	99·25	0·00	...	225·0	5·9	...	193	28·62	24·93

* 128 feet above the ground. † 27 feet above the ground.

Appendix

DUBLIN. Lat. 53° 25′ N.

Month.	Readings of the Barometer.			Temperature of the Air.			Mean				Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
January	29·613	30·074	28·645	57·0	6·0	51·0	41·8	28·5	13·3	35·1	68·4	28·4	37·0	36·1
February	29·921	30·447	28·743	62·1	28·5	33·6	52·4	40·5	11·9	46·4	74·9	38·3	46·3	44·5
March	29·709	30·694	28·843	69·8	23·5	46·3	46·0	33·6	12·4	39·8	77·1	35·0	40·5	38·7
April	29·621	30·253	28·965	65·5	33·0	32·5	58·7	43·9	14·8	51·3	98·1	41·1	51·4	48·8
May	29·771	30·466	29·235	69·0	30·2	38·8	59·9	43·3	16·6	51·6	98·7	44·3	54·2	50·2
June	30·069	30·683	29·410	79·0	38·0	41·0	67·9	48·9	19·0	58·4	119·0	48·4	61·9	57·7
July	29·797	30·266	29·312	79·0	40·4	38·6	69·9	49·5	20·4	59·7	...	49·5	61·1	56·1
August	29·825	30·066	29·512	80·0	42·8	37·2	71·1	52·8	18·3	61·9	...	52·0	64·3	59·6
September	29·943	30·472	29·293	75·2	37·0	38·2	65·4	48·7	16·7	57·0	99·5	49·3	59·8	56·1
October... ...	29·815	30·433	29·398	67·0	31·7	35·3	58·7	43·8	14·9	51·2	90·3	42·2	52·8	50·3
November	30·237	30·638	29·402	57·6	21·2	36·4	49·6	34·3	15·3	41·9	70·0	31·6	44·5	42·2
December	29·967	30·340	29·167	55·0	24·5	30·5	46·8	36·8	10·0	41·8	60·2	32·3	42·7	41·1
Yearly Sums, Means, and Totals ...	29·858	30·403	29·160	68·0	29·7	38·3	57·3	42·0	15·3	49·7	...	41·0	51·4	48·4

BELFAST. 54° 36′ N.

January	29·459	30·051	29·078	48·5	...	...	39·0	...	...	...	75·0	...	35·6	33·9
February	29·674	30·238	28·501	53·2	...	...	45·3	...	...	...	76·0	...	44·5	41·8
March	29·717	30·621	28·649	60·5	35·4	25·1	51·5	37·0	14·5	44·2	78·7	32·3	40·5	38·9
April	29·552	30·165	28·730	69·0	34·8	34·2	58·6	42·9	15·7	50·7	92·9	39·7	51·0	46·6
May	29·774	30·192	29·243	74·0	34·4	39·6	63·7	44·0	19·7	53·8	100·2	41·5	57·2	52·1
June	29·998	30·569	29·164	79·1	39·0	40·1	69·8	49·9	19·8	59·8	104·7	45·9	61·6	54·8
July	29·759	30·240	29·227	85·0	42·4	42·6	70·8	51·0	19·8	60·9	103·5	45·8	61·9	56·7
August	29·770	29·994	29·424	80·0	44·4	35·6	72·8	52·2	20·6	62·5	111·1	47·1	62·1	57·7
September	29·873	30·457	29·241	74·5	41·0	33·5	65·5	48·7	16·8	57·1	95·4	43·1	57·7	53·7
October... ...	29·732	30·352	29·410	66·5	30·6	35·9	57·2	43·3	13·9	50·2	80·0	35·9	51·0	47·8
November	30·210	30·629	29·337	58·2	29 0	29·2	51·4	37·5	13·9	44·4	66·5	29·5	44·7	41·4
December	29 828	30·245	29·038	58·0	27·5	30·5	49·3	36·4	12·9	42·8	52·4	28·9	43·0	40·9
Yearly Sums, Means, and Totals ...	29·779	30·321	28·987	70·5	35·8	34·6	61·0	44·3	16·7	52·6	86·4	39·0	50·9	46·9

ATHLONE. Lat. 53° 23′ N.

January	...	...	...	54·6	1·2	53·4	40·2	25·4	14·8	32·8	...	...	34·7	33·6
February	...	...	...	55·4	30·6	24·8	50·2	35·4	14·8	42·8	...	...	44·7	43·4
March	...	...	...	60·4	20·4	40·0	46·7	31·0	15·7	38·8	...	...	41·1	39·1
April	...	...	...	63·4	29·4	34·0	57·3	39·5	17·4	48·4	...	...	51·3	48·0
May	...	...	...	73·2	33·0	40·2	63·3	43·2	20·1	53·3	...	...	56·5	51·6
June	...	...	...	80·2	39·2	41·0	70·4	47·8	22·6	59·1	...	...	62·1	56·1
July	...	...	...	83·0	39·0	44·0	70·4	49·8	20·6	60·1	...	...	64·5	58·5
August	...	...	...	80·0	41·5	38·5	70·5	50·4	20·1	60·4	...	...	64·7	61·0
September	...	...	...	75·5	35·5	40·0	65·1	45·5	19·6	55·3	...	...	56·2	56·2
October... ...	...	...	...	67·0	31·5	35·5	57·4	41·4	16·0	49·4	...	...	52·5	50·2
November	...	...	...	56·5	25·0	31·5	47·8	33·8	14·0	40·8	...	...	43·7	42·0
December	...	...	...	54·0	20·5	33·5	46·7	34·5	12·2	40·6	...	...	42·4	40·7
Yearly Sums, Means, and Total ...	...	...	...	66·9	28·9	38·0	57·2	39·8	17·3	48·5	...	...	51·4	48·5

* For ten months only.

No. XXII.—*continued.*

Long. 6° 20′ W. Height above Sea 72 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which Rain fell.	On the ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
34·8	·202	2·3	0·3	91·9	552·4	2·50	4·75	11·00	12·25	0·50	...	...	6·4	3·4	9	...	...
42·5	·272	3·1	0·5	87·4	547·5	1·00	2·75	11·50	10·25	2·50	...	...	7·6	3·6	14	1·69	...
36·4	·215	2·5	0·5	86·1	550·2	7·75	10·00	6·50	5·25	1·50	...	...	8·1	2·5	21	3·00	...
46·1	·314	3·5	0·7	82·4	536·4	0·75	0·50	11·50	15·25	2·00	...	...	8·0	3·7	23	2·22	...
46·3	·313	3·5	1·2	74·2	536·1	3·00	11·00	11·00	3·50	2·50	...	78·3	7·5	1·6	14	3·11	...
54·1	·419	4·6	1·5	76·0	532·6	7·00	2·50	5·25	13·25	2·00	...	83·0	7·3	3·4	6	0·77	...
51·8	·384	4·3	1·7	72·0	528·9	5·25	4·25	8·50	9·00	4·00	...	68·9	7·9	3·3	13	1·79	...
55·7	·445	4·9	1·7	73·8	525·9	1·50	1·50	11·75	13·25	3·00	...	93·1	7·4	3·0	15	6·71	...
52·8	·400	4·5	1·3	78·6	532·7	3·25	4·00	11·25	10·00	1·50	...	104·2	7·7	2·3	15	1·27	...
47·8	·333	3·7	0·7	83·3	538·2	1·75	1·75	8·25	14·75	4·50	...	111·2	7·1	3·2	21	2·65	...
39·5	·243	2·8	0·6	82·6	555·4	6·25	0·50	3·25	14·00	6·00	...	67·2	6·5	2·2	6	0·35	...
39·2	·239	2·7	0·4	87·2	552·3	6·75	1·25	4·75	14·75	3·50	...	103·6	7·0	2·9	18	0·75	...
45·6	·315	3·5	0·9	81·3	540·7	46·75	44·75	104·50	135·50	33·50	...	...	7·4	2·9	175	24·31	...

Long. 5° 57′ W. Height above Sea 45 feet.

																	*
31·3	·177	2·1	0·4	84·2	551·2	8·00	7·00	4·00	7·00	5·00	...	84·9	7·4	0·4	9	1·07	...
38·6	·235	2·7	0·6	79·6	545·1	3·00	2·50	5·50	16·00	1·00	...	86·1	7·5	0·8	18	3·00	...
32·3	·183	2·1	0·8	72·8	550·7	5·00	16·50	4·50	4·00	1·00	...	105·7	7·0	1·5	11	2·22	...
42·0	·267	3·0	1·2	71·8	535·8	3·00	1·75	5·75	17·00	2·50	...	172·7	7·5	2·1	22	4·10	3·98
47·4	·327	3·7	1·5	69·7	532·9	4·00	9·25	11·00	5·75	1·00	...	130·7	7·0	2·4	16	4·03	...
48·8	·345	3·8	2·3	62·8	531·9	9·25	3·50	3·25	13·00	1·00	...	114·5	7·2	2·5	8	1·12	...
50·4	·365	4·1	2·1	66·9	527·5	10·25	7·75	3·00	10·00	0·00	...	99·0	7·3	3·5	13	3·37	2·46
54·7	·417	4·6	1·6	75·0	527·3	2·50	4·00	9·00	14·50	1·00	...	86·0	8·2	1·7	17	2·41	...
50·1	·362	4·0	1·3	75·7	534·0	4·50	3·00	8·00	14·00	0·50	...	133·9	7·1	1·1	19	2·08	...
44·5	·294	3·3	0·9	78·8	538·8	6·50	2·25	4·75	15·50	2·00	...	114·8	7·0	0·8	28	5·14	...
37·6	·225	2·6	0·7	75·6	555·0	8·00	3·00	3·50	8·50	7·00	...	87·9	6·9	0·7	9	0·91	...
38·4	·232	2·7	0·5	83·4	549·5	5·00	4·00	6·00	13·00	1·00	...	151·0	6·2	1·0	21	3·77	3·01
43·0	·286	3·2	1·2	74·7	540·0	69·00	64·50	68·25	138·25	23·00	...	113·9	7·2	1·5	191	33·22	...

Long. 8° 0′ W. Height above Sea 304 feet.

31·9	·180	2·1	0·3	89·0	...	7·50	5·50	8·00	7·00	3·00	...	...	2·5	4·7	8	0·32	...
41·2	·266	3·0	0·3	90·3	...	2·50	3·50	11·00	10·00	1·00	...	...	3·4	5·4	19	3·08	...
36·6	·216	2·5	0·5	84·2	...	10·00	11·00	5·50	4·50	0·00	...	...	2·8	5·7	18	2·59	...
44·6	·296	3·4	0·9	78·2	...	2·00	2·00	12·50	13·50	0·00	...	...	2·9	5·9	23	3·69	...
47·0	·324	3·6	1·5	70·5	...	3·50	11·00	11·50	5·00	0·00	...	...	2·9	5·4	15	4·19	...
53·9	·416	4·6	1·8	72·1	...	4·00	1·50	11·00	13·50	0·00	...	...	4·9	4·5	7	1·40	...
53·5	·411	4·5	2·1	67·5	...	7·50	6·00	8·50	9·00	0·00	...	...	6·4	4·6	16	3·94	...
57·9	·492	5·3	1·5	78·5	...	3·50	1·50	13·00	13·00	0·00	...	...	7·0	5·5	21	3·41	...
54·4	·424	4·7	0·7	87·0	...	1·50	3·00	14·00	11·50	0·00	...	...	6·3	5·7	16	2·72	...
47·9	·334	3·7	0·7	84·4	...	2·00	2·00	13·50	13·50	0·00	...	...	6·1	4·2	17	3·74	...
40·0	·247	2·8	0·4	86·4	...	9·00	7·00	7·00	7·00	0·00	...	...	4·6	3·8	2	0·50	...
38·7	·235	2·7	0·4	87·1	...	5·00	2·50	11·50	12·00	0·00	...	...	7·6	4·2	7	1·24	...
45·7	·319	3·6	0·9	81·3	...	58·00	56·50	127·00	119·50	4·00	...	...	4·8	5·0	169	30·82	...

* 30 feet above the ground.

Appendix

CURRAGH CAMP. Lat. 53° 8′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Maximum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·146	29·601	28·157	53·4	21·1	32·3	38·8	25·6	13·2	32·2	47·1	21·5	33·6	32·5
February	29·477	30·227	28·344	54·1	29·5	24·6	49·7	35·6	14·1	42·6	63·1	32·5	43·8	42·4
March	29·274	30·242	28·479	56·2	20·9	35·3	43·8	31·3	12·5	37·5	70·8	27·2	39·0	37·3
April	29·235	29·844	28·619	61·4	30·0	31·4	55·0	40·1	14·9	47·5	83·1	36·2	49·8	47·6
May	29·346	29·736	28·744	72·8	29·9	42·9	60·0	42·0	18·0	51·0	96·5	37·5	53·9	52·8
June	29·647	30·215	29·086	75·0	38·6	36·4	66·6	46·3	20·3	56·4	108·3	41·4	60·1	55·5
July	29·558	29·862	28·921	81·9	36·5	45·4	67·9	47·2	20·7	57·5	105·6	39·9	60·4	56·7
August	29·428	29·681	29·426	79·6	41·2	38·4	69·8	49·4	20·4	59·6	105·1	42·2	62·4	58·1
September	29·540	30·058	28·984	70·0	36·0	34·0	62·4	45·9	16·5	54·1	87·2	37·9	57·0	53·8
October	29·396	30·037	28·879	63·5	31·8	31·7	55·0	41·2	13·8	49·1	69·4	33·0	50·2	48·1
November	29·870	30·212	28·949	53·4	22·4	31·0	47·2	34·3	12·9	40·7	52·8	26·0	42·1	41·7
December	29·575	29·993	28·742	54·8	20·9	33·9	44·2	33·0	11·2	38·6	45·5	27·5	40·1	39·8
Yearly Sums, Means, and Totals ...	29·458	29·976	28·770	64·7	29·9	34·8	55·0	39·3	15·7	47·1	77·8	33·6	49·4	47·2

CORK. Lat. 51° 53′ N.

January	29·293	30·725	28·528	54·5	15·2	39·3	42·7	29·6	13·1	36·1	55·6	...	38·0	36·6
February	29·615	30·126	28·719	56·0	30·7	25·3	51·8	38·6	13·2	45·2	60·6	...	46·8	45·5
March	29·382	30·305	28·769	57·2	24·7	32·5	47·3	34·3	13·0	40·8	72·7	33·8	42·1	40·0
April	29·426	30·005	28·855	63·5	30·5	33·0	57·4	41·7	15·7	49·5	87·8	41·5	51·7	48·7
May	29·274	29·909	28·830	66·0	32·5	33·5	59·0	44·4	14·6	51·7	91·5	43·7	54·8	51·2
June	29·631	30·339	29·186	78·5	40·0	38·5	68·3	47·9	20·4	58·1	110·4	44·6	63·0	57·0
July	29·755	29·933	29·118	79·0	41·0	38·0	72·9	51·2	21·7	62·0	111·6	42·1	63·6	60·4
August	29·448	30·105	29·065	72·0	42·5	29·5	65·6	50·7	14·9	58·1	88·8	46·5	61·1	57·2
September	29·844	30·207	29·366	84·8	43·6	41·2	68·9	54·5	14·4	61·7	97·6	40·8	63·9	60·9
October...	29·583	30·097	29·343	73·2	33·5	39·7	64·0	46·7	17·3	55·3	78·2	41·4	55·4	53·9
November	30·019	30·498	29·217	60·0	26·0	34·0	55·6	37·9	17·7	46·7	60·4	33·2	46·0	43·6
December	29·773	30·143	28·923	57·2	23·2	34·0	49·3	35·3	14·0	42 3	58·4	31·9	43·7	42·1
Yearly Sums, Means, and Totals ...	29·587	30·199	28·993	66·8	31·9	34·9	58·6	43·7	15·8	50·6	81·0	...	52·5	49·8

FERMOY. Lat. 52° 2′ N.

January	...	...	...	* ...	11·0	* ...	* ...	26·8	* ...	* ...	...	...	38·1	37·2
February	...	...	...	...	27·7	...	...	37·8	...	...	...	...	47·2	45·6
March	...	...	...	59·0	23·0	36·0	49·0	32·6	16·4	40·8	...	...	42·6	40·1
April	...	...	...	64·8	29·0	35·8	52·3	37·2	15·1	44·7	...	...	52·4	49·3
May	...	...	...	68·8	30·0	38·8	61·4	45·7	15·7	53·5	...	...	55·3	52·1
June	...	...	...	78·2	41·2	37·0	70·1	48·9	21·2	59·5	...	...	63·4	58·3
July	...	...	...	84·6	42·0	42·6	72·1	50·6	21·5	61·3	...	...	64·2	58·2
August	...	...	...	79·8	43·8	36·0	70·0	52·3	17·7	61·1	...	...	64·6	59·8
September	...	...	...	71·4	35·4	36·0	65·4	47·7	17·7	56·5	...	...	59·6	55·1
October	...	...	...	64·6	34·4	30·2	58·6	44·2	14·4	51·4	...	...	53·2	51·1
November	...	...	...	56·4	24·2	32·2	50·9	36·7	14·2	43·8	...	...	45·9	43·9
December	...	...	...	56·4	23·2	33·2	47·9	34·9	13·0	41·4	...	...	43·0	42·1
Yearly Sums, Means, and Totals ...	...	...	...	68·4	32·6	35·8	59·8	43·1	16·7	51·4	...	...	52·5	49·4

* For ten months only.

No. XXII—*continued.*

Long. 4° 48′ W. Height above Sea 450 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Condition.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot.	Miles.				Inches.	Inches.
30·6	·171	2·0	0·3	88·0	547·7	9·00	3·25	10·50	8·25	0·00	...	328·0	6·5	3·9	10	1·89	1·60
40·7	·255	2·9	0·3	88·8	542·0	1·75	3·50	12·00	10·75	0·00	...	375·0	6·2	4·1	16	2·56	2·15
35·1	·205	2·3	0·5	86·4	543·9	7·50	12·25	6·25	5·00	0·00	...	353·8	7·2	4·3	6	1·81	0·88
45·2	·303	3·5	0·6	85·4	531·0	4·25	0·75	10·25	14·75	0·00	...	456·3	7·5	3·0	23	3·17	2.58
51·7	·385	4·3	0·3	92·3	528·1	2·75	7·75	15·75	4·75	0·00	...	337·3	5·5	4·2	12	3·72	3·34
51·5	·381	4·2	1·6	73·0	527·3	10·75	2·75	4·00	12·50	0·00	...	258·1	4·9	2·6	4	0·87	0·71
53·5	·410	4·5	1·3	78·2	525·1	7·00	5·25	7·75	11·00	0·00	...	237·3	6·6	3·2	14	2·42	2·13
54·5	·425	4·7	1·6	75·5	520·8	2·50	1·50	13·75	13·25	0·00	...	308·5	6·0	4·2	15	2·17	1·82
50·8	·372	4·1	1·1	79·8	528·7	4·25	3·25	10·00	12·00	0·50	...	306·4	5·8	4·2	12	1·29	1·04
45·9	·309	3·5	0·6	85·5	533·5	5·25	2·25	11·75	11·75	0·00	...	355·8	5·9	4·4	24	4·08	3·52
41·2	·259	3·0	0·1	96·8	551·2	7·25	4·75	11·50	6·50	0·00	...	228·9	6·7	3·5	6	1·45	1·19
39.4	·242	2·8	0·1	97·6	548·0	7·25	2·50	9·25	12·00	0·00	...	308·7	6·3	3·7	11	1·56	1·19
45·0	·310	3·5	0·7	85·6	535·6	69·50	49·75	122·75	122·50	0·50	...	321·2	6·3	3·8	153	26·98	22·15

Long. 8° 20 W. Height above Sea 257 feet.

34·7	·201	2·3	0·4	87·8	545·5	12·25	7·75	6·50	4·50	0·00	...	232·8	6·0	2.5	17	3·68	3·41
44·1	·289	3·3	0·4	90·9	541·2	2·75	4·75	8·50	10·50	1·50	...	207·2	8·0	2·0	24	2·67	2·20
37·4	·224	2·6	0·5	84·3	542·5	6·00	14·75	7·00	3·25	0·00	...	194·6	7·0	2·0	13	5·93	5·44
45·7	·308	3·5	0·9	80·0	532·4	7·00	2·75	9·75	10·50	0·00	...	256·7	7·0	1·5	23	2·67	2·40
47·7	·330	3·8	1·1	76·4	526·4	1·00	11·00	18·00	1.00	0·00	...	177·1	8·0	2·6	22	4·58	4·26
51·9	·387	4·3	2·1	67·0	524·0	9·75	8·00	9·25	3·00	0·00	...	160·0	6·0	3·2	8	0·59	0·51
57·7	·479	5·3	1·3	81·4	525·0	8·00	3·25	13·00	6·75	0·00	...	63·2	5·0	2·1	15	1·92	1·66
53·8	·414	4.6	1·4	77·5	522·4	6·75	4·75	9·00	10·50	0.00	...	115·0	6·3	3·7	28	3·44	3·13
58·4	·491	5·5	1·1	82·9	526·2	2·25	7·00	14·50	6·25	0·00	...	115·6	6·0	3·5	18	0·69	0·62
52·4	·396	4·4	0·5	90·4	530·9	4·25	7·25	15·25	4·25	0·00	...	176·5	6·5	2·1	23	3·38	3·10
40·8	·256	3·0	0·6	83·2	549·6	9·50	9·25	6·25	4·50	0·50	...	152·8	6·0	2·8	11	0·81	0·74
40·2	·249	2·8	0·4	87·2	547·7	10·50	8·75	8·00	3·75	0·00	...	246·0	7·0	2·5	20	1·74	1·47
47·1	·335	3·8	0·9	82·4	534·5	80·00	89·25	125·00	68·75	2·00	...	174.8	6·6	2·5	222	32·10	28·94

Long. 8° 18′ W. Height above Sea 176 feet.

35·8	·211	2·4	0·2	92·1	...	8·50	2·50	10·00	10·00	0·00	...	...	5·5	...	14	3·62	...
43·8	·286	3·3	0·4	89·0	...	0·00	5·00	11·50	11·50	0·00	...	...	8·5	...	23	2·53	...
37·1	·221	2·5	0·6	81·5	...	8·00	12·25	5·50	4·75	0·50	...	...	7·5	...	16	4·23	...
46·2	·313	3·5	0·9	79·8	...	8·50	1·50	5·50	13·50	1·00	...	..	8·0	...	25	2·92	...
49·0	·349	3·9	1·0	80·1	...	1·50	10·25	13·25	5·50	0·50	...	...	8·0	...	20	4·60	..
54·0	·418	4·6	1·8	71·9	...	8·25	2·25	5·50	12·00	2·00	...	...	6·0	...	9	0·70	...
53·2	·406	4·5	2·1	67·2	...	6·25	4·00	6·50	12·25	2·00	...	...	7·7	...	17	2·05	...
55·8	·447	4·9	1·8	73·6	...	3·25	3·00	9.50	14·25	1·00	...	...	7·2	...	24	2·55	...
51·1	·376	4·2	1·5	73·6	...	5·25	3·25	7·25	12·25	2·00	...	...	6·7	...	18	2·46	...
49·0	·347	3·9	0·6	85·5	...	8·00	1·50	6·25	9·75	5·50	...	...	7·4	...	28	3·99	...
41·6	·255	3·0	0·6	85·9	...	4·50	6·50	6·50	3·50	9·00	...	...	7·3	...	9	0·72	...
41·0	·257	2·9	0·3	92·8	...	8·25	1·75	4·75	12·25	4·00	...	...	7·9	...	19	0·66	...
46·5	·325	3·6	1·0	81·1	...	70·25	53·75	92·00	121·50	27·50	...	...	7·3	...	222	32·03	...

* 25 feet above the ground.

Appendix

BUTTEVANT. Lat. 52° 14′ N.

Month.	Readings of the Barometer.			Temperature of the Air.*							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Maximum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	...	...	...	...	...	...	...	...	...	...	...	...	32·8	31·5
February	...	...	...	60·4	20·9	39·5	54·6	34·0	20·6	44·3	...	...	45·5	44·0
March	...	...	...	62·0	26·0	36·0	48·7	33·4	15·3	41·0	...	...	44·2	40·1
April	...	...	...	68·0	29·0	39·0	59·7	41·2	19·5	50·4	...	...	52·1	49·3
May	...	...	...	70·4	20·8	49·6	58·8	40·1	18·7	49·4	...	...	50·9	48·1
June	...	...	...	80·8	30·5	50·3	68·4	42·8	25·6	55·6	...	...	59·1	54·1
July	...	...	...	87·0	40·0	47·0	73·6	48·5	25·1	61·0	...	...	64·5	59·1
August	...	...	...	83·5	40·0	43·5	73·5	49·9	23·6	61·7	...	...	61·7	59·9
September	...	...	...	77·0	33·0	44·0	67·6	45·7	21·9	56·6	...	...	59·7	54·0
October	...	...	...	69·0	31·5	37·5	59·4	41·3	68·1	50·3	...	...	53·7	51·0
November	...	...	...	61·0	20·0	41·0	52·2	34·6	17·6	43·4	...	...	45·7	42·7
December	...	...	...	57·0	18·0	39·0	48·7	36·0	12·7	42·3	...	...	42·2	41·0
Yearly Sums, Means, and Totals ...	...	...	...	70·5	28·1	42·4	60·5	40·7	19·8	50·5	...	...	51·0	47·9

FORT REGENT, JERSEY. Lat. 49° 11′ N.

January	...	...	...	56·0	22·0	34·0	54·1	32·5	12·6	38·8	...	...	39·7	37·5
February	...	...	...	58·4	35·5	22·9	53·4	40·9	12·5	47·1	...	...	47·0	45·5
March	...	...	...	59·0	28·0	31·0	51·2	35·8	15·4	43·5	...	...	45·6	42·0
April	...	...	...	66·0	35·0	31·0	60·3	46·1	14·2	53·2	...	...	56·6	52·9
May	...	...	...	78·0	40·0	38·0	74·4	42·7	31·7	58·5	...	...	58·8	54·2
June	...	...	...	82·0	40·0	42·0	79·2	44·1	35·1	61·6	...	...	61·7	58·5
July	...	...	...	84·0	40·0	44·0	79·4	44·0	35·4	61·7	...	...	62·8	60·0
August	...	...	...	88·0	44·0	44·0	76·2	52·7	23·5	64·4	...	...	67·0	62·0
September	...	...	...	82·4	46·3	36·1	69·8	51·6	18·2	60·7	...	...	63·9	61·7
October	...	...	...	66·0	38·0	28·0	61·2	44·5	16·7	52·8	...	...	55·6	53·4
November	...	...	...	63·0	30·0	33·0	54·2	37·9	16·3	46·0	...	...	48·7	47·2
December	...	...	...	57·0	22·0	35·0	47·6	33·7	13·9	40·6	...	...	42·5	39·3
Yearly Sums, Means, and Totals ...	...	...	...	69·9	35·0	34·9	62·7	42·2	20·5	52·4	...	...	54·2	51·3

FORT GEORGE, GUERNSEY. Lat. 49° 33′ N.

January	29·445	30·065	28·791	57·5	23·5	34·0	45·3	34·2	11·1	39·7	64·4	32·2	41·5	40·0
February	29·883	30·392	28·871	56·0	35·5	20·5	51·9	41·3	10·6	46·6	72·6	39·9	47·9	45·8
March	29·464	30·377	28·936	57·0	29·5	27·5	48·5	36·5	12·0	42·5	76·9	35·1	43·9	42·3
April	29·661	30·285	28·958	61·0	36·0	25·0	56·7	42·7	14·0	49·7	93·5	41·7	51·7	50·0
May	29·615	29·914	29·137	78·0	36·5	41·5	62·2	45·9	16·3	54·0	105·5	44·3	56·2	53·8
June	29·982	30·299	29·419	78·0	45·0	33·0	67·2	49·4	17·8	58·3	110·7	46·7	60·5	57·4
July	29·695	30·068	29·297	76·0	48·0	28·0	68·8	51·8	17·0	60·3	127·1	49·6	62·4	59·4
August	29·705	30·030	29·559	80·0	46·5	33·5	71·5	53·3	18·2	62·4	131·3	51·5	64·7	61·5
September	29·868	30·280	29·568	77·5	44·5	33·0	66·8	51·3	15·5	59·0	124·4	49·2	61·6	59·7
October	29·715	30·195	29·316	62·9	38·5	23·5	58·5	45·9	12·6	52·2	91·2	43·5	52·2	51·7
November	30·010	30·368	29·187	63·0	32·0	31·0	52·5	41·6	10·9	47·0	77·2	37·9	48·2	45·2
December	29·816	30·116	29·112	57·0	27·5	29·5	47·5	37·0	10·5	42·2	64·1	34·5	44·4	42·3
Yearly Sums, Means, and Totals ...	29·238	30·199	29·187	66·9	36·9	30·0	58·1	44·2	13·9	51·1	94·9	42·2	52·9	50·8

* For eleven months only.

No XXII—*continued.*

Lon. 8° 40′ W. Height above Sea feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Condition.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or ny calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	Feet above the Ground.
											lbs. per sq. foot.	Miles.				Inches.	Inches.
23·9	·160	1·8	0·3	85·0	..	14·50	5·00	8·00	3·50	0·00	...	...	3.5	...	11	2·91	...
42·2	·270	3·0	0·4	88·5	...	7·50	5·50	15·00	0·00	0·00	...	...	3·4	...	21	3·42	...
35·3	·205	2·4	0·9	70·6	...	8·50	8·00	8·50	6·00	0·00	...	...	6·3	...	14	2·40	...
46·4	·316	3·6	0·8	81·3	...	5·00	2·50	10·00	12·50	0·00	...	...	...	...	23	2·45	...
45·2	·301	3·4	0·7	81·3	...	5·50	10·00	15·50	0·00	0·00	...	...	6·5	...	21	3·71	...
49·6	·355	4·0	1·6	71·0	...	13·00	2·00	9·00	6·00	0·00	...	...	5·6	...	8	0·95	...
54·6	·427	4·7	2·0	70·5	...	10·50	4·50	7·50	8·50	0·00	...	...	5·3	...	18	2·43	...
58·3	·490	5·4	0·7	89·2	...	5·50	2·50	13·00	10·00	0·00	...	...	6·0	...	23	3·05	...
49·0	·347	3·9	1·9	67·5	...	6·00	5·50	9·50	9·00	0·00	...	...	6·6	...	18	2·50	...
48·4	·338	3·8	0·8	81·8	...	10·00	3·50	6·50	11·00	0·00	...	...	7·9	...	27	5·35	...
39·3	·241	2·8	0·8	78·7	...	8·00	7·00	11·00	4·00	0·00	...	...	6·1	...	9	1·07	...
39·5	·243	2·8	0·3	90·4	...	7·50	6·00	9·50	8·00	0·00	...	...	6·8	5·3	19	1·79	...
44·7	·308	3·5	0·9	79·6	...	101·50	62·00	123·00	78·50	0·00	...	...	...	...	212	32·03	...

Long. 2° 6′ W. Height above Sea 72 feet.

34·6	·201	2·3	0 5	82·4	...	6·75	7·25	5·25	11·25	0·50	...	...	5·5	5·7	16	2·83	...
43·8	·286	3·3	0·4	89·5	...	2·50	4·25	4·25	15·50	1·50	...	...	5·7	6·3	21	2·69	...
37·9	·228	2·6	0·9	74·4	...	3·75	14·00	8·00	4·75	0·50	...	...	5·5	6·5	19	5·39	...
49·5	·355	4·0	1·1	77·4	...	4·25	2·75	6·75	16·25	0·00	...	...	6·3	6·4	18	1·72	...
50·1	·362	4·1	1·5	73·0	...	8·25	4·00	3·25	15·00	0·50	...	...	5·8	6·2	7	0·68	...
55·8	·445	4·9	1·2	81·5	...	17·75	3·25	1·50	7·50	0·00	...	...	5·6	5·6	2	0·33	...
57·7	·476	5·3	1·1	83·2	...	0·75	5·00	12·25	13·00	0·00	...	...	5·8	6·4	15	7·46	...
58·0	·483	5·3	2·0	73·0	...	3·75	5·00	7·50	14·75	0·00	...	...	4·9	6·0	7	1·77	...
59·9	·517	5·7	0·9	87·7	..	5·25	5·50	11·25	8·00	0·00	...	...	6·3	6·5	11	1·16	...
51·8	·380	4·2	0·7	86·4	...	4·50	2·50	20·25	2·75	1·00	...	...	6·8	5·2	19	4·70	...
45·5	·306	3·4	0·4	89·5	...	15·50	6·50	6·00	1·00	1·00	...	...	5·7	4·0	5	2·09	...
35·4	·207	2·4	0·7	76·6	...	14·25	2·00	6·50	6·25	2·00	...	...	6·9	5·2	16	2·75	...
43·3	·354	4·0	0·9	81·2	...	87·25	62·00	92·75	116·00	7·00	...	...	5·9	5·7	156	33·57	...

Long. 2° 40′ W. Height above Sea 248 feet.

																	*
38·1	·230	2·7	0·4	88·5	544·1	7·75	6·50	7·25	9·50	0·00	...	525·0	7·5	5·8	18	3·78	3·60
45·6	·306	3·5	0·3	92·3	544·8	5·00	2·75	5·00	13·75	1·50	...	436·3	8·5	6·5	22	1·77	1·62
40·3	·251	2·9	0·4	87·2	541·8	5·25	11·25	7·75	6·25	0·50	...	516·5	7·7	6·4	22	3·98	3·76
48·3	·339	3·8	0·5	88·1	536·6	6·50	1·00	6·75	14·25	1·50	...	492·4	7·3	6·4	16	1·56	1·41
51·5	·393	4·3	0·7	84·6	530·8	5·25	6·75	9·75	7·25	2·00	...	305·6	6·0	2·2	12	1·69	1·56
54·7	·428	4·8	1·1	81·9	532·5	12·00	4·50	1·50	10·00	2·00	...	311·4	3·7	5·6	5	0·88	0·83
56·8	·463	5·1	1·1	82·4	525·2	7·50	4·75	3·50	12·75	2·50	...	329·7	6·1	5·6	18	3·94	3·76
58·8	·496	5·5	1·3	81·5	522·9	6·25	3·75	4·00	10·00	7·00	...	247·1	5·6	6·1	12	1·07	1·00
56·2	·453	5·0	1·1	83·2	529·1	7·25	6·00	5·25	9·00	2·50	...	302·7	5·8	6·3	15	3·71	3·56
51·2	·377	4·3	0·1	96·7	536·8	7·25	3·75	8·25	10·75	1·00	...	...	7·6	6·5	23	3·47	3·25
41·9	·266	3·0	0·8	79·2	548·1	5·00	14·50	7·00	2·50	1·00	...	375·2	7·1	6·6	7	0·43	0·28
39.8	·246	2·8	0·5	84·0	547·7	13·50	8·50	3·00	5·50	0·50	...	425·3	7·9	6·5	12	2·01	1·80
43·6	·353	4·0	0·7	85·8	536·7	88·50	74·00	69·00	111·50	22·00	...	...	6·7	6·1	182	28·29	26·68

* 25 feet above the ground.

APPENDIX

Abstract of Results of Meteorological Observations

GIBRALTAR. Lat. 36° 6′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean Of all the highest.	Mean Of all the lowest.	Mean Daily Range.	Mean Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
January	30·007	30·405	29·395	71·0	38·0	33·0	62·3	50·2	12·1	56·2	80·4	44·9	58·0	53·5
February	30·301	30·502	29·857	70·0	44·0	26·0	64·0	51·1	12·9	57·6	81·5	43·7	60·2	56·6
March	29·789	30·334	29·406	74·1	40·0	34·0	67·6	51·9	15·7	59·8	102·5	47·2	62·3	56·0
April	30·172	30·273	29·727	79·0	50·0	29·0	73·9	54·6	19·3	64·2	125·4	48·7	67·0	61·8
May	29·969	30·118	29·717	83·0	52·0	31·0	76·9	57·0	19·9	67·0	133·2	51·8	69·7	63·9
June	29·996	30·201	29·883	94·0	55·0	39·0	81·9	62·1	19·8	72·0	129·1	59·3	74·4	68·6
July	29·980	30·127	29·854	95·0	60·0	35·0	84·7	64·9	19·8	74·8	132·3	60·9	76·8	70·2
August	30·001	30·114	29·898	87·0	62·5	24·5	83·6	66·5	17·1	75·0	124·7	64·1	77·2	71·8
September ...	30·030	30·302	29·861	89·0	56·0	33·0	79·8	63·4	16·4	71·6	114·4	59·7	79·2	68·1
October... ...	30·038	30·247	29·851	82·0	55·0	27·0	73·1	59·3	13·8	66·2	103·2	54·7	69·4	63·5
November	30·035	30·287	29·444	73·0	50·0	23·0	66·3	55·8	10·5	61·0	83·6	52·1	62·9	60·1
December	30·029	30·217	29·659	67·0	35·0	32·0	60·0	48·0	12·0	54·0	78·2	41·8	56·3	52·3
Yearly Sums, Means, and Totals ...	30·030	30·260	29·713	80·3	49·8	30·5	72·8	57·1	15·8	64·9	107·6	52·4	67·7	62·3

MALTA. Lat. 30° 53′ N.

January	29·785	30·138	29·386	71·6	48·8	22·8	64·8	55·7	9·1	60·2	119·7	48·7	61·8	56·1
February	30·058	30·281	29·767	65·2	45·1	20·1	62·3	53·1	9·2	57·7	122·5	46·1	59·7	53·7
March	29·631	29·896	29·405	83·2	51·5	31·7	68·6	58·0	10·6	63·3	122·1	51·7	65·5	59·9
April	29·758	30·058	29·512	75·0	53·4	21·6	67·9	58·9	9·0	63·4	124·4	53·2	65·0	60·4
May	29·811	29·966	29·695	78·2	58·4	19·8	73·7	63·3	10·4	68·5	126·4	58 3	70·9	63·6
June	29·764	30·040	29·601	84·0	65·5	18·5	79·4	69·0	10·4	74·2	133·9	63·6	76·5	68·6
July	29·813	30·059	29·685	103·3	68·5	34·8	86·2	73·6	12·6	79·9	138·7	67·3	82·2	72·9
August	29·821	29·943	29·607	92·0	66·8	25·2	85·4	74·7	10·7	80·0	140·0	68·1	81·9	74·3
September ...	29·865	29·997	29·460	88·2	61·2	27·0	83·1	73·0	10·1	78·0	136·5	63·2	80·4	72·0
October... ...	29·827	30·079	29·474	82·0	57·4	24·6	74·7	65·1	9·6	69·9	131·4	59·2	72·7	65·4
November ...	29·963	30·135	29·595	73·8	42·4	31·4	65·7	56·7	9·0	61·2	120·4	52·6	64·1	57·8
December ...	29·729	30·122	29·423	67·4	43·2	24·2	60·3	50·3	10·0	55·3	113·5	42·2	56·6	51·6
Yearly Sums, Means, and Totals ...	29·819	30·059	29·551	80·3	55·2	25·1	72·7	62·6	10·1	67·6	127·5	56·2	69·8	63·0

QUEBEC. Lat. 46° 48′ N.

January	29·572	29·973	29·057	44·0	−19·0	63·0	19·6	−0·1	19·7	9·7	25·6	3·7	10·5	10·4
February	29·747	30·511	29·359	52·0	11·0	41·0	32·3	2·4	29·9	17·3	47·0	4·5	13·8	18·0
March	29·777	30·379	29·053	51·0	−12·0	63·0	35·8	12·6	23·2	24·2	66·3	14·1	25·3	24·9
April	29·600	29·994	28·995	61·0	9·0	52·0	46·3	26·1	20·2	36·2	76·1	26·3	37·0	35·1
May	29·585	30·169	29·305	75·0	21·0	54·0	56·4	37·0	19·4	46·7	79·7	38·7	46·9	45·2
June	29·718	29·973	29·225	91·5	67·0	24·0	80·6	51·1	29·5	65·8	114·7	48·5	67·3	60·0
July	29·612	29·909	29·190	90·0	47·0	43·0	84·3	56·4	27·9	70·3	119·1	55·1	72·2	65·6
August	29·668	30·163	29·410	96·5	40·0	56·5	85·1	56·6	28·5	70·8	119·2	54·5	73·2	66·0
September ...	29·748	30·185	29·382	91·0	31·0	60·0	72·1	43·8	28·3	57·9	93·6	47·0	58·5	54·1
October... ...	29·763	30·186	29·200	69·0	27·0	42·0	54·6	33·7	20·9	44·1	72·8	32·9	46·6	43·3
November ...	29·656	30·120	28·909	57·0	8·0	49·0	36·3	22·1	14·2	29·2	43·7	23 1	30·7	28·9
December ...	29·786	31·045	29·022	37·5	−22·0	59·5	19·1	−4·6	23·7	7·2	...	...	6·3	5·9
Yearly Sums, Means, and Totals ...	29·686	30·217	29·142	68·0	17·3	50·6	51·9	28·1	23·8	39·9	78·0	31·7	41·1	38·1

* For eleven months only.

No. XXIII—*continued.*

Long. 52° 42′ W. Height above Sea 130 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.										
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
23·2	·124	1·5	0·2	85·3	560·6	6·25	6·25	2·75	13·25	2·50	...	283·7	9·0	6·0	2	...	...
25·9	·140	1·7	0·2	87·6	564·8	6·00	1·25	4·50	15·75	0·50	...	345·2	8·5	6·0	4	...	...
25·8	·140	1·7	0·4	82·3	561·5	13·25	1·0	5·50	10·25	1·00	...	137·6	7·5	5·5	1	1·50	...
32·1	·183	2·0	0·5	85·9	556·6	10·50	5·00	4·75	9·75	0·00	...	269·6	8·5	5·0	10	3·58	...
40·3	·251	2·9	0·7	79·2	547·2	7·75	6·00	7·75	8·50	1·00	...	191·6	7·0	...	9	3·34	...
49·3	·351	4·0	0·7	83·6	536·9	9·75	3·50	5·00	11·25	0·50	...	265·4	6·5	...	6	1·21	...
51·5	·382	4·2	2·2	66·2	527·7	4·00	5·00	7·75	14·25	0·00	...	217·4	6·5	...	4	1·63	...
57·5	·473	5·2	2·7	66·0	518·4	2·00	3·75	7·50	17·75	0·00	...	254·2	6·5	...	5	0·91	...
55·7	·445	4·9	0·5	91·2	532·3	4·25	2·50	12·25	11·00	0·00	...	213·0	7·0	...	10	3·19	...
44·8	·296	3·4	0·3	91·6	544·2	5·25	3·75	7·75	14·25	0·00	...	282·7	8·0	...	13	6·87	...
35·5	·209	2·4	0·3	89·0	552·5	8·75	2·50	8·25	10·00	0·50	...	233·6	8·0	...	15	7·23	...
23·1	·119	1·4	0·3	87·3	565·7	4·75	3·75	5·25	15·75	1·50	...	318·1	9·0	...	4	3·95	...
38·7	·259	2·9	0·7	82·9	547·4	82·50	44·25	79·00	151·75	7·50	...	251·0	7·7	...	83	...	...

Long. 59° 40′ W. Height above Sea 15 feet.

66·8	·658	7·0	4·5	61·1	510·6	14·75	16·25	0·00	0·00	0·00	...	174·8	2·9	...	18	2·84	2·64
68·0	·685	7·3	3·9	65·0	511·8	13·25	14·25	0·50	0·00	0·00	...	829·9	4·6	...	19	8·23	7·90
67·9	·684	7·3	4·4	62·1	510·3	12·25	16·50	1·75	0·50	0·00	...	866·3	4·4	...	9	1·60	1·45
68·1	·688	7·3	5·2	57·9	508·3	8·25	16·75	5·00	0·00	0·00	...	821·0	5·5	...	12	1·18	1·10
70·4	·743	7·8	5·4	59·2	505·1	5·50	17·50	8·00	0·00	0·00	...	712·0	4·8	...	10	1·42	1·31
71·6	·772	8·3	3·7	68·8	508·6	9·75	16·25	3·25	0·25	0·50	...	179·3	5·6	...	26	8·77	...
71·0	·758	8·1	4·2	65·2	507·7	17·25	10·75	2·25	0·25	0·50	...	202·5	5·2	...	22	7·26	...
72·2	·789	8·4	4·0	67·3	506·9	15·75	13·00	1·75	0·50	0·00	...	169·9	5·9	4·1	18	5·74	4·62
72·3	·794	8·4	3·8	69·2	507·6	11·00	14·25	4·75	0·00	0·00	...	151·0	6·2	3·3	21	9·28	7·86
73·6	·828	8·8	3·1	74·0	507·2	9·75	16·50	4·00	0·75	0·00	...	139·2	6·2	3·2	23	24·05	22·51
71·1	·762	8·1	4·0	66·8	507·5	10·25	17·50	1·75	0·50	0·00	...	111·5	4·8	3·3	14	3·43	3·17
70·5	·746	7·9	3·9	67·2	508·9	16·00	14·50	0·50	0·00	0·00	...	193·2	4·5	3·2	15	2·60	2·26
70·3	·742	7·9	4·2	65·3	508·4	143·75	184·00	33·50	2·75	1·00	...	379·2	5·0	...	207	76·40	...

Long. 64° 40′ W. Height above Sea 61 feet.

52·8	·400	4·4	2·0	69·5	529·1	6·50	0·00	6·00	16·50	2·00	...	358·7	7·6	4·9	22	3·83	2·04
56·4	·456	5·0	1·8	73·0	530·5	6·50	4·50	9·50	4·50	3·00	...	261·9	7·2	4·8	12	4·61	2·76
57·9	·481	5·2	1·7	75·2	525·6	5·25	4·50	10·25	10·00	1·00	...	270·1	7·4	4·6	15	5·28	3·70
57·0	·465	5·2	2·4	66·0	525·6	6·00	4·50	6·00	4·50	9·00	...	233·9	7·3	4·7	5	2·98	...
56·3	·647	7·0	2·0	78·6	517·9	5·25	5·00	9·50	8·25	3·00	...	359·4	5·8	4·4	10	3·12	...
55·3	·626	6·8	2·4	73·7	519·7	3·50	7·50	10·00	5·00	4·00	...	196·5	5·7	3·2	10	1·54	...
71·7	·779	8·3	3·0	74·0	512·4	1·00	2·00	15·50	12·50	0·00	...	248·9	5·7	2·9	13	11·97	8·61
72·7	·805	8·6	3·1	73·6	510·8	1·00	8·50	17·50	4·00	0·00	...	178·6	5·7	3·3	20	6·24	...
71·5	·770	8·3	3·7	68·8	509·7	4·00	7·00	9·50	7·50	2·00	...	155·3	5·8	3·3	16	4·68	...
61·8	·554	5·9	3·5	63·3	516·8	8·50	10·50	5·50	3·50	3·00	...	186·8	5·8	3·6	16	7·07	...
56·6	·460	5·0	2·9	62·4	523·9	8·00	7·00	5·50	9·50	0·00	...	195·9	6·0	5·6	12	3·89	...
56·3	·456	5·0	1·9	72·0	528·2	7·00	2·50	7·50	11·00	3·00	...	244·7	6·3	3·7	16	2·69	...
62·2	·575	6·2	2·5	70·8	520·8	62·50	63·50	112·25	96·75	30·00	...	240·9	6·4	4·1	167	57·90	...

* 30 feet above the ground. † 20 feet above the ground.

Appendix

St. John's, Newfoundland. Lat. 47° 35′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean Of all the highest.	Mean Of all the lowest.	Mean Daily Range.	Mean Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
	*	*	*											
January	29·423	30·198	28·878	50·0	6·0	44·0	37·6	17·5	20·1	27·5	...	21·4	27·1	26·4
February	29·775	30·584	28·723	63·0	0·5	62·5	40·5	15·7	24·8	28·1	...	16·5	29·1	28·4
March	29·668	30·957	28·610	52·8	4·5	48·3	40·2	16·7	23·5	28·4	...	16·3	30·2	29·1
April	29·760	30·232	29·204	55·0	13·9	41·1	45·3	23·6	21·7	34·4	...	23·3	35·9	34·4
May	29·932	30·210	29·276	74·1	24·0	50·1	58·7	31·5	27·2	45·1	...	31·6	46·9	43·8
June	29·828	30·267	29·460	66·0	23·0	43·0	66·6	35·2	31·4	50·9	...	36·0	54·1	51·7
July ... ... * ...	29·830	30·164	29·366	84·0	32·4	51·6	74·7	44·3	30·4	59·5	...	43·9	63·0	56·8
August	29·688	30·258	29·559	87·1	37·0	50·1	78·9	49·1	29·8	64·0	...	47·3	69·1	62·6
September	29·841	30·223	28·942	78·0	29·0	49·0	68·2	41·0	27·2	54·6	...	37·1	58·2	56·9
October...	29·813	30·369	29·262	73·5	24·6	48·9	61·7	35·5	26·2	48·6	...	33·9	47·3	46·1
November	29·727	30·148	28·786	62·1	13·0	49·1	54·6	28·0	26·6	41·3	...	28·9	38·8	37·4
December	29 574	30·195	28·724	51·6	2·2	49·4	45·8	14·4	31·4	30·1	...	13·5	25·2	24·7
Yearly Sums, Means, and Totals ...	29·738	30·317	29·065	68·1	17·5	50·6	56·1	29·4	26·7	42·7	...	29·1	43·7	41·5

St. Anne's, Barbados. Lat. 13° 4′ N.

January	30·003	30·144	29·878	87·0	66·0	21·0	85·7	70·4	15·3	78·0	136·0	64·2	81·7	72·8
February	30·020	30·136	29·881	87·0	62·0	25·0	85·4	70·6	14·8	78·0	135·0	65·7	80·6	73·1
March	30·013	30·120	29·885	90·0	65·5	24·5	87·1	70·7	16·4	78·9	...	63·9	82·1	73·6
April	30·010	30·122	29·918	90·0	70·0	20·0	87·7	72·2	15·5	79·9	...	67·3	84·2	74·5
May	29·957	30·040	29·873	91·5	72·0	19·5	89·3	74·3	15·0	81·8	...	73·2	86·2	76·6
June	29·993	30·062	29·871	90·5	70·0	20·5	88·4	74·1	14·3	81·2	136·8	69·6	82·9	76·1
July	29·989	30·145	29·923	89·8	72·1	17·7	87·8	74·4	13·4	81·1	137·5	68·2	83·8	76·1
August	29·965	30·060	29·814	90·1	71·0	19·1	88·9	74·2	14·7	81·5	138·5	69·7	84·1	76·9
September	29·973	30·090	29·876	90·0	70·5	19·5	88·0	73·8	14·2	80·9	146·1	71·2	83·5	76·8
October...	29·925	30·096	29·773	89·9	70·8	19·1	87·3	73·2	14·1	80·2	136·0	69·8	82·8	77·3
November	29·943	30·066	29·775	89·7	66·4	23·3	88·1	72·9	15·2	80·5	135·8	68·7	83·3	76·0
December	29 974	30·070	29·866	88·0	69·8	18·2	86·5	72·8	13·7	79·6	115·0	68·3	82·5	75·3
Yearly Sums, Means, and Totals ...	29·980	30·096	29·861	89·5	68·8	20·6	87·5	72·8	14·7	80·1	...	68·3	83·1	75·4

Bermuda. Lat. 32° 27′ N.

January	29·913	30·431	29·566	73·8	42·0	31·8	67·1	52·8	14·3	59·9	79·0	49·7	63·0	57·6
February	30·165	30·486	29·752	74·0	46·0	28·0	68·9	55·6	13·3	62·2	98·6	53·4	65·5	60·5
March	29·931	30·385	29·473	74·5	49·0	25·5	70·0	56·3	13·7	63·1	90·2	53·4	66·2	61·6
April	30·059	30·421	29·662	79·4	51·0	28·4	72·3	56·8	15·5	64·5	95·0	51·2	68·4	62·9
May	29·976	30·183	29·697	81·5	56·0	25·5	77·5	62·2	15·3	69·8	98·1	55·3	73·6	69·4
June	30·100	30·249	29·604	90·0	58·0	32·0	82·0	66·0	16·0	74·0	...	60·9	74·2	69·1
July	30·117	30·335	29·802	89·8	64·0	25·8	84·7	70·2	14·5	77·4	...	67·2	81·0	75·5
August	30·087	30·224	29·947	89·6	65·0	24·6	85·1	70·9	14·2	78·0	...	65·7	82·1	76·5
September	30·046	30·097	29·724	90·5	65·0	25·5	85·9	70·2	15·7	78·0	...	62·7	82·6	76·0
October...	29·950	30·298	29·941	84·5	56·5	28·0	79·2	64·5	14·7	71·8	...	55·3	75·1	67·4
November	30·030	30·385	29·600	79·0	52·0	27·0	73·5	59·4	14·1	66·4	...	49·7	69·8	62·4
December	30·050	30·436	29·565	74·0	48·0	26·0	69·8	54·7	15·1	62·2	...	46·6	65·8	60·6
Yearly Sums, Means, and Totals ...	30·035	30·327	29·531	91·7	54·4	27·3	76·3	61·6	14·7	68·9	...	55·9	72·3	66·5

* Barron and Co.

No. XXIII—*continued.*

Long. 52° 42′ W. Height above Sea 130 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.				Amount of Rain fall	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
23·2	·124	1·5	0·2	85·3	560·6	6·25	6·25	2·75	13·25	2·50	...	283·7	9·0	6·0	2	...	...
25·9	·140	1·7	0·2	87·6	564·8	6·00	1·25	4·50	15·75	0·50	...	345·2	8·5	6·0	4	...	...
25·8	·140	1·7	0·4	82·3	561·5	13·25	1·0	5·50	10·25	1·00	...	137·6	7·5	5·5	1	1·50	...
32·1	·183	2·0	0·5	85·9	556·6	10·50	5·00	4·75	9·75	0·00	...	269·6	8·5	5·0	10	3·58	...
40·3	·251	2·9	0·7	79·2	547·2	7·75	6·00	7·75	8·50	1·00	...	191·6	7·0	...	9	3·34	...
42·3	·351	4·0	0·7	83·6	536·9	9·75	3·50	5·00	11·25	0·50	...	265·4	6·5	...	6	1·21	...
51·5	·382	4·2	2·2	66·2	527·7	4·00	5·00	7·75	14·25	0·00	...	217·4	6·5	...	4	1·63	...
57·5	·473	5·2	2·7	66·0	518·4	2·00	3·75	7·50	17·75	0·00	...	254·2	6·5	...	5	0·91	...
55·7	·445	4·9	0·5	91·2	532·3	4·25	2·50	12·25	11·00	0·00	...	213·0	7·0	...	10	3·19	...
44·8	·296	3·4	0·3	91·6	544·2	5·25	3·75	7·75	14·25	0·00	...	282·7	8·0	...	13	6·87	...
35·5	·209	2·4	0·3	89·0	552·5	8·75	2·50	8·25	10·00	0·50	...	233·6	8·0	...	15	7·23	...
23·1	·119	1·4	0·3	87·3	565·7	4·75	3·75	5·25	15·75	1·50	...	318·1	9·0	...	4	3·95	...
38·7	·259	2·9	0·7	82·9	547·4	82·50	44·25	79·00	151·75	7·50	...	251·0	7·7	...	83	...	...

Long. 59° 40′ W. Height above Sea 15 feet.

																	*
66·8	·658	7·0	4·5	61·1	510·6	14·75	16·25	0·00	0·00	0·00	...	174·8	2·9	...	18	2·84	2·64
68·0	·685	7·3	3·9	65·0	511·8	13·25	14·25	0·50	0·00	0·00	...	829·9	4·6	...	19	8·23	7·99
67·9	·684	7·3	4·4	62·1	510 3	12·25	16·50	1·75	0·50	0·00	...	866·3	4·4	...	9	1·60	1·45
68·1	·688	7·3	5·2	57·9	508·3	8·25	16·75	5·00	0·00	0 00	...	821·0	5·5	...	12	1·18	1·10
70·4	·743	7·8	5·4	59·2	505·1	5·50	17·50	8·00	0·00	0·00	...	712·0	4·8	...	10	1·42	1·31
71·6	·772	8·3	3·7	68·8	508·6	9·75	16·25	3·25	0·25	0·50	...	179·3	5·6	...	26	8·77	...
71·0	·758	8·1	4·2	65·2	507·7	17·25	10·75	2·25	0·25	0·50	...	202·5	5·2	...	22	7·26	...
72·2	·789	8·4	4·0	67·3	506·9	15·75	13·00	1·75	0·50	0·00	...	169·9	5·9	4·1	18	5·74	4·63
72·3	·794	8·4	3·8	69·2	507·6	11·00	14·25	4·75	0·00	0·00	...	151·0	6·2	3·3	21	9·28	7·98
73·6	·828	8·8	3·1	74·0	507 2	9·75	16·50	4·00	0·75	0 00	...	139·2	6·2	3·2	23	24·05	22·51
71·1	·762	8·1	4·0	66·8	507·5	10·25	17·50	1·75	0·50	0·00	...	111·5	4·8	3·3	14	3·43	3·17
70·5	·746	7·9	3·9	67·2	508·9	16·00	14·50	0·50	0·00	0·00	...	193·2	4·5	3·2	15	2·60	2·26
70·3	·742	7·9	4·2	65·3	508·4	143·75	184·00	33·50	2·75	1·00	...	379·2	5·0	...	207	76·40	...

Long. 64° 40′ W. Height above Sea 61 feet.

																	†
52·8	·400	4·4	2·0	69·5	529·1	6·50	0·00	6·00	16·50	2·00	...	358·7	7·6	4·9	22	3·83	2·04
56·4	·456	5·0	1·8	73·0	530·5	6·50	4·50	9·50	4·50	3·00	...	261·9	7·2	4·8	12	4·61	2·76
57·9	·481	5·3	1·7	75·2	525·6	5·25	4·50	10·25	10·00	1·00	...	270·1	7·4	4·6	15	5·28	3·70
57·0	·465	5·2	2·4	66·0	525·6	6·00	4·50	6·00	4·50	9·00	...	233·9	7·3	4·7	5	2·98	...
56·3	·647	7·0	2·0	78·6	517·9	5·25	5·00	9·50	8·25	3·00	...	359·4	5·8	4·4	10	3·12	...
55·3	·626	6·8	2·4	73·7	519·7	3·50	7·50	10·00	5·00	4·00	...	196·5	5·7	3·2	10	1·54	...
71·7	·779	8·3	3·0	74·0	512·4	1·00	2·00	15·50	12·50	0·00	...	248·9	5·7	2·9	13	11·97	8·61
72·7	·805	8·6	3·1	73·6	510·8	1·00	8·50	17·50	4·00	0·00	...	178·6	5·7	3·3	20	6·24	...
71·5	·770	8·3	3·7	68·8	509·7	4·00	7·00	9·50	7·50	2·00	...	155·3	5·8	3·3	16	4·68	...
61·8	·554	5·9	3·5	63·3	516·8	8·50	10·50	5·50	3·50	3·00	...	186·8	5·8	3·6	16	7·07	...
56·6	·460	5·0	2·9	62·4	523·9	8·00	7·00	5·50	9·50	0·00	...	195·9	6·0	5·6	12	3·89	...
56·3	·456	5·0	1·9	72·0	528·2	7·00	2·50	7·50	11·00	3·00	...	244·7	6·3	3·7	16	2·69	...
62·2	·575	6·2	2·5	70·8	520·8	62·50	63·50	112·25	96·75	30·00	...	240·9	6·4	4·1	167	57·90	...

* 20 feet above the ground. † 20 feet above the ground.

Appendix

St. John's, Newfoundland. Lat. 47° 35′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
	*	*	*											
January	29·423	30·198	28·878	50·0	6·0	44·0	37·6	17·5	20·1	27·5	...	21·4	27·1	26·4
February ...	29·775	30·581	28·723	63·0	0·5	62·5	40·5	15·7	24·8	28·1	...	16·5	29·1	28·4
March	29·668	30·957	28·610	52·8	4·5	48·3	40·2	16·7	23·5	28·4	...	16·3	30·2	29·1
April	29·760	30·232	29·204	55·0	13·9	41·1	45·3	23·6	21·7	34·4	...	23·3	35·9	34·4
May	29·932	30·210	29·276	74·1	24·0	50·1	58·7	31·5	27·2	45·1	...	31·6	46·9	43·8
June	29·828	30·267	29·450	86·0	23·0	63·0	66·6	35·2	31·4	50·9	...	36·0	54·1	51·7
July	29·830	30·164	29·366	84·0	32·4	51·6	74·7	44·3	30·4	59·5	...	43·9	63·0	56·8
August	29·688	30·258	29·559	87·1	27·0	50·1	78·9	49·1	29·8	64·0	...	47·3	69·1	62·6
September ...	29·841	30·223	28·942	78·0	29·0	49·0	68·2	41·0	27·2	54·6	...	37·1	58·2	56·9
October... ...	29·813	30·369	29·262	73·5	24·6	48·9	61·7	35·5	26·2	48·6	...	33·9	47·3	46·1
November ...	29·727	30·148	28·786	62·1	13·0	49·1	54·6	28·0	26·6	41·3	...	28·9	38·8	37·4
December ...	29 674	30·195	28·724	51·6	2·2	49·4	45·8	14·4	31·4	30·1	...	13·5	25·2	24·7
Yearly Sums, Means, and Totals ...	29·738	30·317	29·065	68·1	17·5	50·6	56·1	29·4	26·7	42·7	...	29·1	43·7	41·5

St. Anne's, Barbados. Lat. 13° 4′ N.

January	30·003	30·144	29·873	87·0	66·0	21·0	85·7	70·4	15·3	78·0	136·0	64·2	81·7	72·8
February ...	30·020	30·136	29·881	87·0	62·0	25·0	85·4	70·6	14·8	78·0	135·0	65·7	80·6	73·1
March	30·013	30·120	29·885	90·0	65·5	24·5	87·1	70·7	16·4	78·9	...	63·9	82·1	73·6
April	30·010	30·122	29·918	90·0	70·0	20·0	87·7	72·2	15·5	79·9	...	67·3	84·2	74·5
May	29·957	30·040	29·873	91·5	72·0	19·5	89·3	74·3	15·0	81·8	...	73·2	86·2	76·6
June	29·993	30·062	29·871	90·5	70·0	20·5	88·4	74·1	14·3	81·2	136·8	69·6	82·9	76·1
July	29·989	30·145	29·923	89·8	72·1	17·7	87·8	74·4	13·4	81·1	137·5	68·2	83·8	76·1
August	29·966	30·060	29·814	90·1	71·0	19·1	88·9	74·2	14·7	81·5	138·5	69·7	84·1	76·9
September ...	29·973	30·090	29·876	90·0	70·5	19·5	88·0	73·8	14·2	80·9	146·1	71·2	83·5	76·8
October... ...	29·925	30·096	29·773	89·9	70·8	19·1	87·3	73·2	14·1	80·2	136·0	69·8	82·8	77·3
November ...	29·943	30·066	29·775	89·7	66·4	23·3	88·1	72·9	15·2	80·5	135·8	68·7	83·3	76·0
December ...	29·974	30·070	29·866	88·0	69·8	18·2	86·5	72·8	13·7	79·6	115·0	68·3	82·5	75·3
Yearly Sums, Means, and Totals ...	29·980	30·096	29·861	89·5	68·8	20·6	87·5	72·8	14·7	80·1	...	68·3	83·1	75·4

Bermuda. Lat. 32° 27′ N.

January	29·913	30·431	29·566	73·8	42·0	31·8	67·1	52·8	14·3	59·9	79·0	49·7	63·0	57·5
February ...	30·165	30·486	29·752	74·0	46·0	28·0	68·9	55·6	13·3	62·2	98·6	53·4	65·5	60·5
March	29·931	30·385	29·473	74·5	49·0	25·5	70·0	56·3	13·7	63·1	90·2	53·4	66·2	61·6
April	30·059	30·421	29·662	79·4	51·0	28·4	72·3	56·8	15·5	64·5	95·0	51·2	68·4	62·0
May	29·976	30·163	29·697	81·5	56·0	25·5	77·5	62·2	15·3	69·8	98·1	55·3	73·6	66·4
June	30·100	30·249	29·604	90·0	58·0	32·0	82·0	66·0	16·0	74·0	...	60·9	74·2	69·1
July	30·117	30·335	29·802	89·8	64·0	25·8	84·7	70·2	14·5	77·4	...	67·2	81·0	75·5
August	30·087	30·224	28·987	89·6	65·0	24·6	85·1	70·9	14·2	78·0	...	65·7	82·1	76·5
September ...	30·046	30·097	29 724	90·5	65·0	25·5	85·9	70·2	15·7	78·0	...	62·7	82·8	76·0
October... ...	29·950	30·298	28 941	84·5	56·5	28·0	79·2	64·5	14·7	71·8	...	55·3	75·1	67·4
November ...	30·020	30·385	29·600	79·0	52·0	27·0	73·5	59·4	14·1	66·4	...	49·7	69·8	62·4
December ...	30·050	30·436	29·665	74·0	48·0	26·0	69·8	54·7	15·1	62·2	...	46·6	65·8	60·6
Yearly Sums, Means, and Totals ...	30·035	30·327	29·531	81·7	54·4	27·3	76·3	61·6	14·7	68·9	...	55·9	72·3	66·5

* Barron and Co.

No. XXIII—*continued.*

Long. 52° 42′ W. Height above Sea 130 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	20 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
23·2	·124	1·5	0·2	85·3	560·6	6·25	6·25	2·75	13·25	2·50	...	283·7	9·0	6·0	2	...	...
25·9	·140	1·7	0·2	87·6	564·8	6·00	1·25	4·50	15·75	0·50	...	345·2	8·5	6·0	4	...	...
25·8	·140	1·7	0·4	82·3	561·5	13·25	1·0	5·50	10·25	1·00	...	137·6	7·5	5·5	1	1·50	...
32·1	·183	2·0	0·5	85·9	556·6	10·50	5·00	4·75	9·75	0·00	...	269·6	8·5	5·0	10	3·58	...
40·3	·251	2·9	0·7	79·2	547·2	7·75	6·00	7·75	8·50	1·00	...	191·6	7·0	...	9	3·34	...
42·3	·351	4·0	0·7	83·6	536·9	9·75	3·50	5·00	11·25	0·50	...	265·4	6·5	...	6	1·21	...
51·5	·382	4·2	2·2	66·2	527·7	4·00	5·00	7·75	14·25	0·00	...	217·4	6·5	...	4	1·63	...
57·5	·473	5·2	2·7	66·0	518·4	2·00	3·75	7·50	17·75	0·00	...	254·2	6·5	...	5	0·91	...
55·7	·445	4·9	0·5	91·2	532·3	4·25	2·50	12·25	11·00	0·00	...	213·0	7·0	...	10	3·19	...
44·8	·296	3·4	0·3	91·6	544·2	5·25	3·75	7·75	14·25	0·00	...	282·7	8·0	...	13	6·87	...
35·5	·209	2·4	0·3	89·0	552·5	8·75	2·50	8·25	10·00	0·50	...	233·6	8·0	...	15	7·23	...
23·1	·119	1·4	0·3	87·3	565·7	4·75	3·75	5·25	15·75	1·50	...	318·1	9·0	...	4	3·95	...
38·7	·269	2·9	0·7	82·9	547·4	82·50	44·25	79·00	151·75	7·50	...	251·0	7·7	...	83	...	...

Long. 59° 40′ W. Height above Sea 15 feet.

																	*
66·8	·658	7·0	4·5	61·1	510·6	14·75	16·25	0·00	0·00	0·00	...	174·8	2·9	...	18	2·84	2·64
68·0	·685	7·3	3·9	65·0	511·8	13·25	14·25	0·50	0·00	0·00	...	829·9	4·6	...	19	8·23	7·80
67·9	·684	7·3	4·4	62·1	510 3	12·25	16·50	1·75	0·50	0·00	...	866·3	4·4	...	9	1·60	1·45
68·1	·688	7·3	5·2	57·9	508·3	8·25	16·75	5·00	0·00	0 00	...	821·0	5·5	...	12	1·18	1·10
70·4	·743	7·8	5·4	59·2	506·1	5·50	17·50	8·00	0·00	0·00	...	712·0	4·8	...	10	1·42	1·31
71·6	·772	8·3	3·7	68·8	508·6	9·75	16·25	3·25	0·25	0·50	...	179·3	5·6	...	26	8·77	...
71·0	·758	8·1	4·2	65·2	507·7	17·25	10·75	2·25	0·25	0·50	...	202·5	5·2	...	22	7·26	...
72·2	·789	8·4	4·0	67·3	506·9	15·75	13·00	1·75	0·50	0·00	...	169·9	5·9	4·1	18	5·74	4·62
72·3	·794	8·4	3·8	69·2	507·6	11·00	14·25	4·75	0·00	0·00	...	151·0	6·2	3·3	21	9·28	7·88
73·6	·828	8·8	3·1	74·0	507 2	9·75	16·50	4·00	0·75	0 00	...	139·2	6·2	3·2	23	24·05	22·51
71·1	·762	8·1	4·0	66·8	507·5	10·25	17·50	1·75	0·50	0·00	...	111·5	4·8	3·3	14	3·43	3·17
70·5	·746	7·9	3·9	67·2	508·9	16·00	14·50	0·50	0·00	0·00	...	193·2	4·5	3·2	15	2·60	2·26
70·3	·742	7·9	4·2	65·3	508·4	143·75	184·00	33·50	2·75	1·00	...	379·2	5·0	...	207	76·40	...

Long. 64° 40′ W. Height above Sea 61 feet.

																	†
52·8	·400	4·4	2·0	69·5	529·1	6·50	0·00	6·00	16·50	2·00	...	358·7	7·6	4·9	22	3·83	2·04
56·4	·456	5·0	1·8	73·0	530·5	6·50	4·50	9·50	4·50	3·00	...	261·9	7·2	4·8	12	4·61	2·76
57·9	·481	5·3	1·7	75·2	525·6	5·25	4·50	10·25	10·00	1·00	...	270·1	7·4	4·6	15	5·28	3·70
57·0	·465	5·2	2·4	66·0	525·6	6·00	4·50	6 00	4·50	9·00	...	233·9	7·3	4·7	5	2·98	...
56·3	·647	7·0	2·0	78·6	517·9	5·25	5·00	9·50	8·25	3·00	...	359·4	5·8	4·4	10	3·12	...
55·3	·626	6·8	2·4	73·7	519·7	3·50	7·50	10·00	5·00	4·00	...	196·5	5·7	3·2	10	1·54	...
71·7	·779	8·3	3·0	74·0	512·4	1·00	2·00	15·50	12·50	0·00	...	248·9	5·7	2·9	13	11·97	8·61
72·7	·805	8·6	3·1	73·6	510·8	1·00	8·50	17·50	4·00	0·00	...	178·6	5·7	3·3	20	6·24	...
71·5	·770	8·3	3·7	68·8	509·7	4·00	7·00	9·50	7·50	2·00	...	155·3	5·8	3·3	16	4·68	...
61·8	·554	5·9	3·5	63·3	516·8	8·50	10·50	5·50	3·50	3·00	...	186·8	5·8	3·6	16	7·07	...
56·6	·460	5·0	2·9	62·4	523·9	8·00	7·00	5·50	9·50	0·00	...	195·9	6·0	5·6	12	3·89	...
56·3	·456	5·0	1·9	72·0	528·2	7·00	2·50	7·50	11·00	3·00	...	244·7	6·3	3·7	16	2·69	...
62·2	·575	6·2	2·5	70·8	520·8	62·50	63·50	112·25	96·75	30·00	...	240·9	6·4	4·1	167	57·90	...

* 30 feet above the ground. † 20 feet above the ground.

Appendix

Up Park Camp, Jamaica. Lat. 19° 59′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·734	29·937	29·630	91·0	66·0	25·0	87·2	68·3	18·9	77·7	...	58·5	83·7	73·7
February	29·731	29·914	29·590	91·0	66·0	25·0	87·0	69·0	18·0	78·0	...	59·5	84·9	74·2
March	29·709	29·851	29·667	98·0	63·0	35·0	89·6	67·7	21·9	78·6	...	61·0	84·8	74·9
April	29·700	29·848	29·616	98·0	64·0	34·0	96·0	66·7	29·3	81·3	...	62·4	85·1	76·5
May	29·630	29·750	29·612	100·0	64·0	36·0	97·4	67·5	29·9	82·4	...	65·8	86·8	78·0
June	29·704	29·819	29·607	104·0	65·0	39·0	99·2	67·2	32·0	83·2	...	66·1	86·4	78·2
July	29·687	29·859	29·635	106·0	62·0	44·0	100·2	65·1	35·1	82·6	...	64·9	88·1	78·3
August...	29·705	29·805	29·597	102·0	60·0	42·0	97·5	63·9	33·6	80·7	...	64·1	85·9	77·6
September	29·726	29·783	29·666	100·0	59·0	41·0	96·5	62·6	33·9	79·5	...	63·4	86·6	78·0
October...	29·660	29·791	29·579	101·0	57·0	44·0	97·1	78·1	19·0	87·6	...	61·6	86·6	77·7
November	29·709	29·795	29·634	100·0	50·0	50·0	93·2	74·4	18·8	83·8	...	60·3	84·5	77·2
December	29·772	29·869	29·689	97·0	64·0	33·0	93·4	67·5	25·9	80·4	...	61·5	84·0	76·0
Yearly Sums, Means, and Totals ...	29·706	29·835	29·627	99·0	61·7	37·3	94·5	68·2	26·4	81·3	...	62·4	85·6	76·7

Newcastle, Jamaica. Lat. 18° 6′ N.

January	...	...	...	76·5	57·0	19·5	72·4	59·5	12·9	65·9	...	...	67·3	63·6
February	...	...	...	74·0	57·0	17·0	70·5	59·3	11·2	64·9	...	...	66·4	63·3
March	...	...	...	76·0	56·0	20·0	72·1	59·8	12·3	65·9	...	...	68·3	64·7
April	...	...	...	76·0	59·0	17·0	72·3	61·7	10·6	67·0	...	...	69·0	65·8
May	...	...	...	76·0	59·0	17·0	73·0	63·6	9·4	68·3	...	...	69·3	67·8
June	...	...	...	76·0	62·0	14·0	73·8	64·1	9·7	68·9	...	...	70·3	68·0
July	...	...	...	83·0	63·0	20·0	82·0	64·7	17·3	73·3	...	...	71·2	66·5
August*	...	...	...	...	...	...	...	...	...	...	...	...	...	...
September	...	...	...	78·0	59·0	19·0	75·3	64·8	10·5	70·0	...	...	68·2	65·1
October...	...	...	...	78·0	59·0	19·0	74·0	64·0	10·0	69·0	...	...	67·4	64·5
November	...	...	...	76·0	51·0	25·0	70·4	60·4	10·0	65·4	...	...	64·0	63·0
December	...	...	...	81·0	42·0	42·0	73·6	52·3	21·3	62·9	...	...	65·1	61·9
Yearly Sums, Means, and Totals ...	...	...	...	77·6	56·7	20·9	73·6	61·3	12·3	67·4	...	...	67·9	64·9

Victoria, Hong Kong. Lat. 22° 16′ N.

January	30·176	30·431	29·964	74·0	40·5	33·5	65·3	52·3	13·0	58·8	84·7	...	59·9	55·1
February	30·106	30·241	29·999	79·0	46·0	33·0	68·2	56·3	11·9	62·2	81·2	...	62·2	57·3
March	29·524	30·229	29·384	87·0	54·0	33·0	72·0	60·9	11·1	66·4	83·7	...	67·2	63·5
April	29·950	30·188	29·740	90·0	56·5	33·5	80·5	67·9	12·6	74·2	102·0	...	75·5	70·2
May	29·811	29·942	29·631	90·0	63·5	26·5	84·0	73·3	10·7	78·6	103·0	...	79·3	73·7
June	29·777	29·924	29·645	103·0	71·0	32·0	93·1	78·5	14·6	85·8	127·1	...	85·7	79·1
July	29·740	29·877	29·522	101·0	63·0	38·0	92·3	74·7	17·6	83·5	125·0	...	86·6	79·2
August...	29·727	29·959	29·574	99·5	69·0	30·5	91·6	75·6	16·0	83·6	129·6	74·0	84·5	78·9
September	29·685	29·987	29·374	97·0	67·5	29·5	90·7	76·6	14·1	83·6	135·5	74·1	84·9	76·9
October...	29·924	30·059	29·234	93·0	67·0	26·0	86·5	73·3	13·2	79·9	127·8	70·0	80·6	73·4
November	30·108	30·397	29·907	88·5	50·0	38·5	76·2	60·6	15·6	68·4	120·9	54·5	70·0	68·1
December	30·091	30·329	29·921	77·5	51·0	26·5	70·9	56·8	14·1	63·8	109·5	50·1	65·1	56·7
Yearly Sums, Means, and Totals ...	29·885	30·130	29·658	90·0	58·2	31·7	80·9	67·2	13·7	74·1	110·8	...	75·1	68·7

* No observations taken in August, the troops being encamped in the vicinity.

No. XXIII—*continued.*

Long. 76° 56′ W. Height above Sea 225 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.										
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of days on which rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	30 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
67·0	·664	7·1	5·2	57·0	504·2	2·00	17·00	11·75	0·25	0·00	...	83·6	3·3	4·1	2	1·25	...
67·2	·669	7·1	5·7	54·9	503·0	2·00	13·50	10·75	1·75	0·00	...	104·5	3·0	4·2	1	0·08	...
68·4	·697	7·4	5·3	57·3	502·5	0·50	15·00	15·00	0·50	0·00	...	121·1	2·6	3·8	2	0·20	0·17
70·9	·758	8·0	4·8	62·2	501·9	0·50	14·50	14·25	0·75	0·00	...	113·9	3·2	4·3	3	1·16	...
72·3	·795	8·3	5·2	61·6	499·0	0·00	15·50	15·50	0·00	0·00	...	89·8	3·5	4·0	3	1·93	...
72·9	·811	8·5	4·8	63·6	500·4	0·00	15·00	15·00	0.00	0·00	...	97·3	2·1	4·0	7	5·52	5·52
72·0	·786	8·2	5·9	58·6	498·6	0·00	15·50	15·50	0·00	0·00	...	87·2	3·3	4·0	5	2·60	...
72·2	·792	8·3	4·8	63·7	500·9	0·50	15·50	15·00	0·00	0·00	...	68·0	3·5	4·0	6	14·25	...
72·4	·798	8·4	5·0	62·2	500·6	14·50	15·50	0·00	0·00	0·00	...	100·4	4·4	4·0	9	3·70	...
71·9	·786	8·3	5·2	61·3	499·7	2·75	15·50	12·75	0·00	0·00	...	42·2	3·0	4·0	4	2·18	1·91
72·4	·797	8·5	4·1	66·8	502·1	5·50	14·25	10·00	0·25	0·00	...	47·2	3·5	4·0	13	31·98	29·10
70·7	·751	8·0	4·4	64·0	504·1	5·50	15·00	10·50	0·00	0·00	...	44·8	2·5	4·0	3	1·01	0·71
70·9	·759	8·0	5·0	61·1	501·3	33·75	181·75	146·00	3·50	0·00	...	83·3	3·1	4·0	58	65·86	...

Long. 76° 42′ W. Height above Sea 3,800 feet.

61·0	·538	5·9	1·5	80·5	...	2·00	14·50	14·50	0·00	0·00	...	...	4·7	6·0	3	...	...
60·8	·533	5·8	1·3	82·5	...	2·25	11·75	11·75	2·25	0·00	...	...	5·2	6·0	3	...	...
61·8	·553	6·0	1·6	80·0	...	0·25	15·25	15·25	0·25	0·00	...	...	3·9	6·1	3	...	...
63·3	·580	6·4	1·4	82·0	...	0·25	14·50	14·75	0·50	0·00	...	...	4·7	5·9	4	...	...
66·6	·652	7·1	0·7	91·3	...	0·00	15·50	15·50	0·00	0·00	...	...	4·2	5·4	17	...	...
66·3	·646	7·0	1·0	86·5	...	0·00	15·00	15·00	0·00	0·00	...	...	4·0	6·5	12	...	...
62·9	·575	6·2	2·1	74·7	...	0·00	15·50	15·50	0·00	0·00	...	...	4·5	6·0	12	2·81	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
62·6	·569	6·2	1·4	82·5	...	0·00	15·00	15·00	0·00	0·00	...	...	4·5	5·0	17	4·91	...
62·2	·561	6·1	1·2	83·5	...	0·00	15·00	15·00	0·00	1·00	...	...	5·5	...	18	6·11	...
62·2	·560	6·2	0·4	94·0	...	0·00	15.00	15·00	0·00	0·00	...	...	6·9	...	27	6·72	...
59·2	·505	5·5	1·3	82·0	...	0·00	15·50	15·50	0·00	0·00	...	...	4·4	...	5	1·26	...
62·6	·570	6·2	1·3	83·6	...	4·75	162·50	162·75	3·00	1·00	...	...	4·8	...	126	...	...

Long. 114° 9′ E. Height above Sea 43 feet.

																*
54·3	·422	4·7	0·3	93·7	540·8	7·75	9·75	0·00	3·50	10·00	...	...	2·5	4·4	5	1·03	0·89
53·1	·405	4·5	1·8	72·5	533·1	10·25	10·25	0·00	1·00	6·50	...	...	3·7	4·4	5	0·30	0·25
60·6	·529	5·8	1·6	79·5	517·2	5·75	14·75	1·00	0·50	9·00	...	...	4·7	4·5	13	8·30	7·62
66·4	·650	7·0	2·6	73·0	515·8	4·00	9·00	8·00	9·00	0·00	...	...	4·3	3·0	4	3·17	2·72
72·1	·788	8·4	2·3	78·6	508·9	3·75	14·00	8·00	0·25	5·00	...	...	5·3	4·3	22	10·67	9·42
74·8	·865	9·1	4·0	69·8	501·9	3.25	11·00	10·00	1·75	4·00	...	...	3·1	3·2	10	9·50	9·14
74·4	·854	8·9	4·4	67·0	500·7	2·50	13·75	11·75	2·50	1·50	...	...	4·2	3·8	13	24·70	22·88
75·2	·876	9·2	3·3	73·6	501·9	3·25	16·00	9·25	1·50	1·00	...	...	3·0	3·9	11	16·50	15·93
71·7	·778	8·3	4·5	64·9	501·6	9·00	16·00	2·25	1·75	1·00	...	...	3·5	3·9	11	18·54	18·03
68·5	·698	7·4	3·7	66·2	510·0	9·00	18·00	2·25	1·25	0·50	...	...	2·5	3·5	2	9·45	9.02
49·0	·347	3·8	4·2	47·3	525·6	12·50	16·00	0·25	1·25	0·00	...	...	1·0	2·8	0	0·00	0·00
49·8	·358	3·9	2·9	57·4	530·3	8·25	22.25	0·00	0·50	0·00	...	...	1·4	2·8	0	0·00	0·00
64·2	·631	6·7	3·0	70·3	515·6	79·25	170·75	52·75	21·75	37·50	...	...	3·3	3·7	96	102·16	95·97

* 23 feet above the ground.

Appendix

AUCKLAND, NEW ZEALAND. Lat. 36° 50′ S.

Month	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	29·797	30·150	29·558	89·2	55·0	34·2	81·4	60·8	20·6	71·1	116·3	59·3	73·5	68·1
February	29·783	29·963	29·540	88·5	51·8	36·7	79·3	57·7	21·6	68·5	115·6	55·2	72·6	65·3
March	29·805	30·894	28·967	88·3	46·5	41·8	76·4	53·6	22·8	65·0	109·7	50·4	69·4	61·4
April	30·045	30·240	29·657	81·8	43·0	38·8	73·5	52·4	21·1	62·9	100·1	48·9	65·9	61·1
May	29·949	30·367	29·430	78·0	31·9	46·1	66·6	46·6	20·0	56·6	89·0	41·6	59·2	55·3
June	29·823	30·295	29·359	70·1	33·0	37·1	60·2	42·6	17·6	51·4	76·6	39·9	53·9	52·0
July	29·790	30·206	29·692	75·0	33·4	41·6	64·6	42·8	21·8	53·7	79·0	39·3	55·0	52·2
August	29·607	30·456	28·961	73·9	35·0	38·9	62·9	41·8	21·1	52·3	83·5	38·8	54·0	50·9
September	29·797	30·245	29·386	71·0	37·0	34·0	65·5	46·2	19·3	55·8	91·7	42·5	59·1	56·0
October... ...	29·672	30·018	29·374	74·5	36·0	38·5	68·1	48·1	20·0	58·1	95·9	45·9	61·0	56·2
November	29·656	30·120	29·061	76·7	35·9	40·8	68·9	46·6	22·3	57·7	104·1	45·2	62·5	57·0
December	29·862	30·284	29·426	88·5	45·1	43·4	76·4	54·6	21·8	65·5	118·4	52·9	68·9	64·5
Yearly Sums, Means, and Totals ...	29·799	30·270	29·368	79·6	40·3	39·3	70·3	49·5	20·8	59·9	98·3	46·7	62·9	58·3

TRINCOMALEE. Lat. 8° 30′ N.

January	...	...	...	90·0	68·0	22·0	87·8	72·3	15·5	80·0	...	...	83·6	73·3
February	...	...	...	91·5	63·5	28·0	88·3	71·2	17·1	79·7	...	...	83·3	75·3
March	...	...	...	95·0	68·6	26·4	91·8	72·9	18·9	82·3	...	...	86·0	78·2
April	...	...	...	98·6	71·0	27·6	94·9	73·3	21·6	84·1	...	...	88·9	79·9
May	...	...	...	104·0	66·0	38·0	96·9	74·0	22·9	85·4	...	...	89·9	80·2
June	...	...	...	103·6	72·2	31·4	98·9	75·0	23·9	86·9	...	...	92·0	81·3
July	...	...	...	102·4	69·6	32·8	96·8	73·9	22·9	85·3	...	...	88·1	78·5
August... ...	...	...	...	102·4	69·4	33·0	98·7	73·2	25·5	85·9	...	...	87·9	77·1
September	...	...	...	100·0	68·4	31·6	95·7	72·4	23·3	84·0	...	...	87·1	76·9
October... ...	...	...	...	98·4	68·8	29·6	92·2	70·9	21·3	81·5	...	...	85·6	77·5
November	...	...	...	94·2	64·8	29·4	88·2	70·3	17·9	79·2	...	...	82·2	75·2
December	...	...	...	93·8	63·0	30·8	87·0	70·1	16·9	78·5	...	...	80·9	73·6
Yearly Sums, Means, and Totals ...	...	...	...	97·8	67·8	30·0	93·1	72·5	20·6	82·7	...	...	86·3	77·3

NEWERA ELLIA, CEYLON. Lat. 6° 48′ N.

January	24·112	24·190	24·084	83·5	22·0	61·5	72·7	37·3	35·4	55·0	...	35·8	61·4	55·9
February	24·103	24·191	23·989	81·0	20·2	60·8	72·1	40·6	31·5	56·3	...	35·0	63·7	60·6
March	24·117	24·187	24·034	81·2	31·0	50·2	76·7	39·4	37·3	58·0	..	33·0	66·7	60·2
April	24·090	24·134	23·982	83·0	32·0	51·0	77·3	41·2	36·1	59·2	...	35·0	67·9	60·7
May	24·061	24·146	23·980	81·3	40·5	40·8	76·4	50·5	25·9	63·4	...	45·3	65·3	61·2
June	24·009	24·128	23·875	79·3	38·4	40·9	72·6	50·2	22·4	61·4	...	44·6	63·4	59·6
July	24·038	24·133	23·982	75·0	43·3	31·7	74·4	57·2	17·2	65·8	...	46·8	61·3	60·2
August	24·019	24·147	23·987	75·4	40·3	34·6	69·5	49·1	20·4	59·3	...	48·6	63·4	58·6
September	24·041	24·148	23·981	76·0	34·0	42·0	67·7	50·7	17·0	59·2	...	46·5	61·6	58·7
October... ...	24·065	24·138	23·974	81·4	29·4	52·0	73·3	45·7	27·6	59·5	121·0	40·7	63·5	59·1
November	24·111	24·205	23·987	81·2	36·0	45·2	72·2	45·0	27·2	58·6	134·9	40·9	63·4	58·2
December	24·103	24·167	24·050	78·0	32·0	46·0	72·9	45·8	27·1	59·3	131·9	41·9	62·8	58·0
Yearly Sums, Means, and Totals ...	24·072	24·159	23·992	79·7	33·3	46·4	73·1	46·1	27·1	59·6	...	41·0	63·7	59·3

No. XXIII—*continued.*

Long.174° 50′ E. Height above Sea 140 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.											
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	In a Cubic Foot of Air.			Mean Weight of Cubic Foot of Air.	Number of Days for mean Direction of Wind.				Number of calm, or nearly calm, Days.	Calculated from Robinson's Anemometer.		Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.	
		Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.		North.	East.	South.	West.		Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.				On the Ground.	22 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
64·1	·600	6·5	2·4	72·5	515·2	9·50	11·25	6·25	4·00	0·00	...	...	7·9	2·3	11	3·96	3·28
59·8	·517	5·6	3·1	63·8	516·5	2·75	1·25	11·25	12·75	0·00	...	...	6·4	3·0	9	5·56	5·66
56·2	·436	4·8	3·1	60·0	520·5	3·00	6·25	11·75	10·00	0·00	...	...	6·8	2·9	12	0·97	0·47
57·2	·469	5·1	1·8	74·0	527·9	8·50	11·00	7·25	3·25	0·00	...	...	6·5	2·6	10	7·72	...
51·8	·386	4·3	1·3	76·8	533·4	7·25	10·75	2·50	3·50	0·00	...	...	5·8	3·2	13	4·58	3·44
50·1	·361	4·1	0·6	86·7	537·0	3·50	11·00	11·25	4·25	0·00	...	...	5·4	2·5	21	7·75	6·96
49·5	·354	3·9	1·0	82·2	535·4	3·00	4·25	15·25	8·50	0·00	...	...	6·3	2·1	19	3·10	2·00
47·9	·331	3·7	0·9	79·4	533·1	3·00	2·00	10·75	14·25	1·00	...	...	6·2	2·4	24	5·20	...
53·2	·406	4·6	1·0	81·5	530·8	7·25	11·75	5·00	4·50	1·50	...	...	6·7	1·9	15	3·09	...
52·0	·388	4·3	1·6	73·0	526·7	4·50	0·25	8·00	18·25	0·00	...	...	6·9	2·1	24	4·28	...
52·3	·393	4·3	1·9	69·5	524·9	2·25	0·50	9·00	17·75	0·50	...	...	6·7	2·5	17	4·60	...
61·0	·537	5·8	1·9	76·0	521·3	10·75	1·75	7·00	8·50	3·00	...	...	7·1	1·4	15	2·38	...
54·5	·431	4·7	1·7	74·6	526·9	65·25	72·00	112·25	109·50	6·00	...	...	6·6	2·4	190	53·19	...

Long. 82° 0′ E. Height above Sea 25 feet.

66·4	·650	6·9	5·3	56·1	...	16·00	14·50	0·25	0·25	0·00	...	...	3·4	1·2	6	1·42	...
70·0	·732	7·8	4·6	64·3	...	14·75	13·25	0·00	0·00	0·00	...	...	4·3	1·9	8	2·31	...
73·1	·817	8·6	4·6	64·8	...	13·25	11·75	3·75	2·25	0·00	...	...	1·9	1·5	2	0.11	...
74·2	·844	8·9	5·5	61·9	...	5·00	9·75	10 75	4.50	0·00	...	...	4·4	1·6	6	0·40	...
74·1	·844	8·8	5·9	59·1	...	0·00	2·75	16·00	12·25	0·00	...	...	2·8	1·4	8	4·44	...
74·7	·861	8·9	6·8	56·9	...	0·00	0·00	14·00	16·00	0·00	...	...	2·3	2·6	2	0·38	..
72·4	·795	8·3	5·7	59·2	...	0·00	0·00	15·50	15·50	0·00	...	...	4·3	3·3	5	6·25	...
70·2	·739	7·7	6·2	55·6	...	0·75	1·00	13·00	16·25	0·00	...	...	4·1	3·8	8	6·16	...
70·4	·743	7·8	5·8	57·4	...	1·00	1·00	15·50	12·50	0·00	...	...	6·3	2·1	10	6·07	...
72·2	·793	8·4	4·6	64·2	...	6·00	7·75	10·00	7·25	0·00	...	...	4·8	4·9	21	6·60	...
70·5	·747	7·9	3·8	68·0	...	10·00	18·00	0·75	1·25	0·00	...	...	4·7	2·6	18	8·56	...
69·0	·710	7·5	3·7	66·6	...	14·25	15·75	0·00	1·00	0·00	...	...	4·4	1·9	16	7·55	...
71·4	·773	8·1	5·2	61·2	...	81·00	95·50	99·50	89·00	0·00	...	...	4·0	2·4	110	50·25	...

Long. 80° 48′ E. Height above Sea 6,200 feet.

51·2	·376	4·2	1·8	69·9	428·1	0·75	26·75	3·50	0·00	0·00	...	...	7·0	3·8	9	2·20	...
58·0	·484	5·4	1·2	82·1	424·9	1·50	21·75	4·75	0·00	0·00	...	...	6·8	3·7	8	1·08	...
55·0	·433	4·8	2·4	66·2	423·7	1·25	22·75	5·75	1·25	0·00	...	...	6·6	3·7	9	3·47	...
55·0	·434	4·7	2·7	63·2	422·1	2·25	23·00	4·75	0·00	0·00	...	...	7·3	3·5	13	4·81	...
58·0	·483	5·3	1·5	78·0	423·2	10·00	5·25	3·50	12·25	0·00	...	...	8·0	3·7	19	7·48	...
56·2	·453	5·0	1·5	77·9	423·6	15·25	0·00	0·25	14·50	0·00	...	...	8·3	3·8	11	3·99	...
59·2	·505	5·6	0·4	93·4	425·9	18·25	0·75	0·25	11·75	0·00	...	...	8·4	4·4	19	7·56	...
54·9	·433	4·8	1·7	74·4	424·0	15·50	1·00	0·00	14·50	0·00	...	...	6·9	4·5	13	3·24	...
56·2	·453	5.0	1·1	83·2	426·0	16·25	0·50	0·00	13·25	0·00	...	...	8·3	4·0	18	0·57	...
55·4	·440	4·9	1·6	75·5	424·7	12·75	7·50	1·75	9·00	0·00	...	...	8·3	4·0	19	7·59	...
53·8	·415	4·6	1·8	71·4	426·1	8·25	5·50	7·25	9·00	0·00	...	...	5·7	4·0	16	2·39	...
54·0	·416	4·6	1·7	73·0	426·2	0·00	17·50	13·50	0·00	0·00	...	...	6·4	4·2	11	8·08	...
55·6	·444	4·9	1·6	75·7	424·9	102·00	132·25	45·25	85·50	0·00	...	...	7·3	3·9	165	52·46	...

KANDY, CEYLON. Lat. 7° 18′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean.						Hygrometer	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's Rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	...	...	...	86·0	55·6	30·4	81·7	62·5	19·2	72·1	...	...	77·6	70·5
February	...	...	...	88·3	53·5	34·8	84·2	60·5	23·7	72·3	...	...	83·3	72·6
March	...	...	...	90·6	60·4	30·2	86·9	64·5	22·4	75·7	...	...	86·2	75·6
April	...	...	...	91·3	61·4	29·9	87·0	65·7	21·3	76·3	...	...	85·1	77·0
May	...	...	...	92·8	62·6	30·2	83·6	66·2	17·4	74·9	...	...	80·8	76·3
June	...	...	...	90·9	62·7	28·2	83·9	67·2	16·7	75·5	...	...	81·2	75·6
July	...	...	...	95·8	69·4	26·4	89·8	64·6	25·2	77·2	...	...	79·0	74·3
August...	...	...	...	97·9	58·7	39·2	90·8	65·1	25·7	77·9	...	...	80·5	75·2
September	...	...	...	94·5	53·2	31·3	81·3	64·7	16·6	73·0	...	...	79·5	74·8
October...	...	...	...	87·6	56·5	31·1	81·8	63·8	18·0	72·8	...	...	80·0	75·9
November	...	...	...	96·0	58·6	37·4	86·6	62·9	23·7	74·7	...	...	80·5	75·5
December	...	...	...	95·0	52·0	43·0	89·9	60·9	29·0	75·4	...	...	80·0	74·6
Yearly Sums, Means, and Totals ...	...	...	...	91·4	58·8	32·7	85·6	64·0	21·6	74·8	...	...	81·1	74·8

SCUTARI CEMETERY. Lat. 41° 0′ N.

January	29·946	30·169	29·410	64·0	24·0	40·0	52·3	39·5	12·8	45·9	84·0	34·0	47·9	46·0
February	30·145	30·593	29·570	58·4	28·0	30·4	50·2	34·8	15·4	42·5	87·0	29·4	45·7	42·7
March	29·863	30·341	29 400	75·2	26·2	49·0	53·2	37·2	16·0	45·2	96·6	32·5	47·5	44·6
April	29·834	30·180	29·537	77·6	32·8	44·8	62·8	43·2	19·6	53·0	118·6	37·2	56·7	52·5
May	29·870	30·064	29·619	85·4	41·4	44·0	70·3	49·0	21·3	59·6	121·7	44·0	64·9	58·7
June	29·816	30·000	29·564	89·6	48·8	40·8	77·7	55·9	21·8	66·8	130·0	50·7	71·8	65·0
July	29·844	30·055	29·592	95·4	53·6	41·8	85·3	60·2	25·1	72·7	132·3	54·8	79·1	69·9
August...	29·856	30·061	29·652	92·2	53·0	39·2	83·2	58·9	24·3	71·1	131·7	54·3	76·8	68·3
September	29·999	30·203	29·824	85·2	46·0	39·2	79·2	54·4	24·8	66·8	125·5	49·3	72·4	64·6
October...	29·996	30·244	29·758	84·6	43·2	41·4	78·3	53·1	20·2	63·2	112·7	48·6	67·7	62·4
November	29·989	30·422	29·631	70·0	29·0	41·0	54·1	39·2	14·9	46·6	80·4	35·6	49·9	46·8
December	29·788	30·443	29·343	68·0	23·0	45·0	50·3	37·1	13·2	43·7	76·0	33·4	44·7	41·1
Yearly Sums, Means, and Totals ...	29·912	30·231	29·575	78·8	37·4	41·4	66·0	46·9	19·1	56·4	108·0	42·0	60·4	55·2

BOMBAY. Lat. 18° 57′ N.

January	29·971	30·074	29·817	85·5	62·0	23·5	81·7	67·9	13·8	74·8	115·7	65·2	77·8	69·6
February	29·924	30·040	29·791	84·5	62·5	22·0	80·9	66·9	14·0	73·9	115·9	62·9	77·0	68·3
March	29·885	30·010	29·739	87·4	69·2	18·2	83·6	71·7	11·9	77·6	122·2	69·0	80·7	73·5
April	29·826	29·944	29·690	91·2	74·2	17·0	85·8	76·4	9·4	81·1	126·0	73·8	83·8	77·6
May	29·738	29·815	29·627	91·6	77·9	13·7	90·1	81·0	9·1	85·5	126·5	78·0	88·0	79·7
June	29·671	29·847	29·627	93·1	76·1	17·0	88·9	81·5	7·4	85·2	114·7	79·1	86·9	80·7
July	29·672	29·831	29·528	87·8	73·4	14·4	83·9	77·6	6·3	80·7	103·7	74·6	81·9	78·3
August	29·695	29·806	29·573	85·4	75·1	10·3	82·9	77·4	5·5	80·1	99·6	74·9	81·3	78·1
September	29·753	29·935	29·577	85·4	73·2	12·2	83·7	76·8	6·9	80·2	111·9	75·1	81·8	77·8
October...	29·831	29·952	29·697	89·4	72·0	17·4	85·5	75·8	9·7	80·6	125·6	74·2	82·9	77·2
November	29·990	30·142	29·817	88·5	67·7	20·8	83·5	71·3	12·2	77·4	120·0	69·2	80·2	71·4
December	29·985	30·091	29·863	85·4	61·2	24·2	82·0	68·8	13·2	75·4	113·4	66·8	78·6	71·3
Yearly Sums, Means, and Totals ...	29·828	29·960	29·687	87·9	70·4	17·5	84·4	74·4	10·0	79·4	116·3	71·9	81·7	75·3

No. XXIII—*continued.*

Long 80° 48′ E. Height above Sea 1,678 feet.

Hygrometrical Results from Glashier's Tables.						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Water.	Mean Weight of Water.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
65·5	·630	6·8	3·4	66·6	...	14·75	14·75	0·00	0·00	1·50	...	...	3·0	4·0	5	1·15	...
65·5	·628	6·7	5·4	54·9	...	12·00	13·00	0·00	0·00	3·00	...	...	1·0	4·1	1	0·29	...
68·7	·702	7·4	5·9	56·2	...	8·25	10·75	2·50	2·50	7·00	...	...	3·5	4·2	7	3·86	...
71·8	·779	8·3	4·5	63·7	...	3·25	3·25	4·50	4·50	14·50	...	...	6·0	5·1	15	5·79	...
73·2	·820	8·8	2·4	78·3	...	0·00	0·00	10·75	10·75	9·50	...	...	7·5	4·0	24	10·95	...
71·8	·781	8·3	3·0	73·6	...	0·00	0·00	14·75	14·75	0·50	...	...	6·9	3·8	16	2·29	...
71·1	·762	8·1	2·5	76·5	...	0·00	0·00	14·50	14·50	2·00	...	...	6·6	4·5	19	9·70	...
71·6	·775	8·3	2·8	74·0	...	0·00	0·00	15·25	15·25	0·50	...	...	4·9	2·3	18	3·70	...
71·6	·775	8·3	2·5	77·0	...	0·00	0·00	15·00	15·00	0·00	...	...	5·7	1·6	15	2·10	...
73·1	·815	8·7	2·3	79·5	...	0·25	0·25	13·75	13·75	3·00	...	...	5·8	1·8	17	11·38	...
72·1	·789	8·4	2·7	75·5	...	12·25	12·25	0·50	0·50	4·50	...	...	4·2	2·0	11	6·16	...
70·9	·758	8·1	3·5	73·4	...	14·25	14·25	0·00	0·00	2·50	...	...	3·1	2·1	7	2·36	...
70·6	·751	8·0	3·4	70·8	...	65·00	68·50	91·50	91·50	46·50	...	...	4·8	3·3	155	59·73	...

Long. 29° 3′ E. Height above Sea 60 feet.

						*	*	*	*								†
43·9	·286	3·2	0·5	86·7	546·0	5·75	4·50	12.50	6·00	2·25	...	231·0	7·1	5·7	10	4·18	3·67
39·2	·241	2·8	0·8	78·7	552·3	5·75	9·75	6·25	4·25	2·00	...	238·3	5·8	6·5	15	2·51	2·12
41·4	·261	3·0	0·7	80·2	545·1	8·50	10·75	6·00	3·25	2·50	...	217·9	7·7	7·5	17	3·59	3·24
48·6	·342	3·9	1·3	74·5	534·3	8·00	4·75	10·25	3·50	3·50	...	157·2	4·6	5·7	12	2·14	1·96
53·5	·412	4·5	2·2	66·9	526·3	5·50	9·00	9·25	4·25	3·00	...	143·8	3·8	5·7	6	1·26	1·17
59·9	·516	5·6	2·8	65·8	517·8	7·50	5·25	10·25	5·50	1·50	...	157·0	3·7	6·0	10	3·34	3·18
63·6	·578	6·3	4·3	58·4	510·8	12 00	11·50	3·75	2·25	1·50	...	196·0	1·4	4·9	1	0·10	0·07
62·3	·563	6·1	3·8	61·8	513·4	8·00	20·00	2·50	0·50	0·00	...	216·8	3·4	4·6	5	2·75	2·59
58·7	·497	5·4	3·2	61·8	520·5	6·00	16·50	1·50	0·50	1·50	...	225·4	3·1	3·9	1	0·01	0·01
58·2	·487	5·3	2·1	71·5	525·2	9·50	9·00	5·00	6·50	1·00	...	214·6	5·3	3·9	7	1·87	1·79
43·5	·284	3·2	0·8	79·2	544·7	9·50	7·00	5·25	4·75	0·50	...	297·5	7·2	5·3	19	5·52	5·00
36·9	·219	2·5	0·8	73·5	547·1	7·75	5·50	8·75	5·50	0·00	...	341·5	7·4	5·1	19	3·62	2·86
50·8	·391	4·3	1·9	71·6	532·0	93·75	113·50	81·25	46·75	19·25	...	219·7	5·0	5·4	122	30·89	27·66

Long. 72° 52′ E. Height above Sea 37 feet.

						‡	‡	‡	‡								§
63·8	·595	6·4	3·8	63·0	514 2	6·00	12·25	0·25	7·50	0·00	...	...	2·4	...	0	0·00	0·00
62·2	·560	6·0	4·0	60·2	514·3	8·50	7·50	0·25	7·75	0·00	...	...	1·0	...	0	0·00	0·00
68·6	·700	7·4	3·7	66·2	509·3	10·50	7·00	0·25	6·25	0·00	...	...	2·8	..	0	0·00	0·00
73·5	·825	8·7	3·6	71·2	504·6	11·00	3·75	0·75	9·50	0·00	...	...	1·6	...	0	0·00	0·00
74·4	·851	8·9	5·0	63·8	499·2	1·75	1·00	5·75	17·50	0·00	...	...	2·9	...	0	0·00	0·00
76·7	·922	9·7	3·8	71·2	498·8	0·25	0·00	6·25	18·50	0·00	...	...	7·1	...	20	9·15	8·12
75·9	·894	9·5	2·1	82·9	503·3	0·00	2·00	4·00	21·00	0·00	...	...	9·1	...	28	30·90	27·92
75·9	·896	9·5	1 9	84·3	504·2	0·00	0·00	5·75	20·25	0·00	...	...	9·1	...	29	12·82	11·36
75·1	·872	9·2	2·3	80·8	504·9	0·25	3·75	4·00	17·00	0·00	...	...	8·4	...	21	7·15	6·45
73·4	·821	8·7	3·2	73·2	505·6	0·50	3·75	9·50	12·25	0·00	...	...	5·4	...	9	5·33	5·03
65·4	·625	6·7	4·3	60·0	512·1	8·50	7·00	1·75	8·75	0·00	...	...	2·9	...	3	0·13	0·07
66·2	·645	6·9	3·6	66·4	504·8	11 25	6·50	0·00	7·25	0·00	...	...	1·4	...	0	0·00	0·00
70·9	·767	8·1	3·4	70·3	506·3	58·50	54·50	38·50	153·50	0·00	...	...	4·5	...	110	65·48	58·95

* 10·50 days not taken. † 20 feet above the ground. ‡ 60·00 days not taken. § 46 feet above the ground.

Appendix

POONA. Lat. 78° 31′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean				Maximum in Sun's rays.	Minimum on Grass.	Hygrometer.	
							Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.			Dry Bulb.	Wet Bulb.
January	27·976	28·117	27·850	87·0	58·8	28·2	82·4	63·7	18·7	73·0	106·2	57·1	75·2	64·0
February	27·920	28·077	27·791	92·8	54·2	38·6	85·8	65·3	20·5	75·5	109·6	58·3	78·1	64·7
March	27·902	28·060	27·730	93·4	64·0	29·4	90·6	70·1	20·5	80·3	112·3	62·7	83·4	66·7
April	27·890	27·993	27·685	99·4	68·4	31·0	94·6	75·8	18·8	85·2	146·9	69·9	87·4	69·8
May	27·733	27·878	27·593	101·4	70·6	30·8	95 1	77·5	17·6	86·3	145·1	72·2	88·8	73·2
June	27·702	27·873	27·554	94·9	71·9	23·0	88·7	76·0	12·6	82·3	136·4	71·6	83·4	74·9
July	27·694	27·893	27·541	92·4	70·1	22·3	82·6	72·3	10·3	77·4	127·6	68·8	78·7	72·2
August	27·735	27·858	27·630	82·8	70·0	12·8	78·8	71·2	7·6	75·0	121·9	68·7	75·8	71·6
September	27·775	27·946	27·642	84·6	67·0	17·6	82·0	71·2	10·8	76·6	130·8	67·3	77·9	71·7
October...	27·868	28·000	27·707	88·9	67·4	21·5	83·0	70·0	13·0	76·5	133·9	66·5	78·2	71·2
November	28·008	28·148	27·809	84·5	59·0	25·5	81·1	63·4	17·7	72·2	129·2	56·5	74·9	63·7
December	28·000	28·146	27·880	82·8	59·1	23·7	79·3	62·0	17·3	70·6	128·2	55·5	73·5	63·9
Yearly Sums, Means, and Totals ...	27·850	27·998	27·701	90·4	65·0	25·4	85·3	69·9	15·4	77·6	127·3	64·6	79·6	68·9

BELGAUM. Lat. 15° 50′ N.

January	27·444	27·524	27·374	84·6	56·8	27·8	81·4	59·0	22·4	70·2	120·6	56·3	75·5	66·4
February	27·425	27·576	27·332	94·8	56·4	38·4	70·4	59·5	10·9	64·9	130·3	58·0	77·2	68·5
March	27·383	27·504	27·221	101·4	61·9	39·5	97·8	64·9	32·9	81·3	139·5	62·5	84·1	67·2
April	27·321	27·415	27·219	103·5	64·8	38·7	99·6	68·2	31·4	83·9	143·9	62·6	86·0	69·3
May	27·278	27·389	27·182	101·2	62·7	38·5	97·0	68·5	28·5	82·7	140·1	60·0	83·8	74·0
June	27·247	27·356	27·112	97·8	64·8	33·0	92·0	66·8	25·2	79·4	130·2	66·6	77·7	74·6
July	27·240	27·412	27·096	84·2	64·8	19·4	78·6	66·4	12·2	72·5	115·7	63·1	72·9	70·8
August	27·266	27·379	27·162	81·4	67·0	14·4	77·9	68·4	9·5	73·1	107·6	65·3	72·5	71·1
September	27·282	27·465	27·159	89·0	63·5	25·5	83·8	65·8	18·0	74·8	118·9	64·2	73·2	70·8
October...	27·332	27·476	27·163	93·4	64·3	29·1	91·5	65·5	26·0	78·5	129·8	62·7	76·0	71·5
November	27·425	27·579	27·265	89·6	58·6	31·0	86·7	60·0	26·7	73·3	126·5	55·4	74·9	66·4
December	27·397	27·564	27·296	91·3	55·4	35·9	87·9	57·0	30·9	72·4	128·5	55·0	74·9	65·4
Yearly Sums, Means, and Totals ...	27·337	27·470	27·215	92·7	61·7	30·9	87·0	64·1	22·9	75·6	127·6	61·0	77·3	69·7

No. XXIII—*continued.*

Long. 73° 53′ E. Height above Sea 1,750 feet.

Hygrometrical Results from Glaisher's Tables.						Atmospherical Conditions.										
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	Amount of Rain fall.
																On the Ground. / 23½ Feet above the Ground.
											lbs. per sq. foot.	Miles				Inches / Inches
56·0	·448	4·9	4·6	51·4	483·3	1·00	10·75	12·50	6·75	0·00	...	...	2·6	...	0	0·00 / 0·00
55·4	·440	4·7	5·6	45·8	479·8	10·00	3·75	2·75	11·50	0·00	...	...	0·5	...	0	0·00 / 0·00
54·0	·417	4·5	7·7	36·6	475·1	11.75	2·75	11·50	5·00	0.00	...	...	3·2	...	0	0·00 / 0·00
58·5	·492	5·2	8·5	37·8	471·2	16·50	0·25	0·25	13·00	0·00	...	...	2·6	...	0	0·00 / 0·00
63·3	·581	6·1	8·2	42·0	466·7	8·75	0·00	3·50	18·75	0·00	...	...	4·2	...	0	0·00 / 0·00
69·3	·715	7·6	4·6	62·4	469·8	6·50	0·25	3·50	19·75	0·00	...	...	7·6	...	15	2·02 / 1·21
67·7	·679	7·2	3·2	69·0	473·8	3·75	0·00	5·00	22·25	0·00	...	...	8·6	...	16	1·79 / 1·02
68·5	·700	7·5	2·1	78·8	476·8	3·00	0·00	4·50	23·50	0·00	...	...	8·4	...	22	5·84 / 4·16
67·3	·672	7·2	3·1	70·2	476·0	4·75	0·00	3·75	21·50	0·00	...	..	6·5	...	2	1·38 / 1·15
66·3	·647	6·9	3·4	67·2	477·4	10·75	7·50	5·25	7·50	0·00	...	...	4·5	...	9	18·38 / 16·10
55·6	·445	4·8	4·5	51·4	484·1	8·00	17·25	4·75	0·00	0·00	...	...	2·3	...	2	1·46 / 1·19
56·8	·465	5·0	3·9	56·1	485·2	0·25	14·50	18·75	2·50	0.00	...	...	2·1	..	1	0·11 / 0·06
61·6	·558	6·0	4·9	55·7	476·6	85·00	57·00	71·00	152·00	0·00	...	...	4·4	...	67	30·9 / 24·89

Long. 74° 36′ E. Height above Sea 2,500 feet.

						*	*	*	*								†
59·9	·517	5·6	4·0	58·1	473·5	2·25	14·25	11·25	3·25	0·00	...	...	4·1	...	0	0·00	...
62·4	·563	6·1	4·0	60·1	471·2	3·50	7·75	10·25	6·50	0·00	...	...	4·2	...	0	0·00	...
56·0	·450	4·7	7·7	38·4	465·5	5·75	4·00	4·00	9·25	8·00	...	...	3·3	...	1	0·83	...
59·0	·503	5·3	7·5	40·9	463·4	3·75	4·00	7·00	7·75	7·50	...	...	3·2	...	3	0·97	...
67·5	·673	7·1	5·2	57·6	462·5	2·75	0·25	6·75	20·25	1·00	...	...	4·6	...	7	2·18	...
72·4	·798	8·5	1·6	83·5	466·3	0·50	0·00	6·75	20·75	0·50	...	...	9·2	...	18	8·93	5·02
69·2	·716	7·7	1·0	88·5	470·9	0·00	0·00	12·25	17·25	0·00	...	...	7·5	...	21	12·82	12·44
70·0	·735	7·9	0·7	92·1	471·5	0·00	0·00	11·75	19·25	0·00	...	...	8·7	...	24	8·71	8·10
69·0	·710	7·7	1·2	87·0	471·4	0·00	0·00	6·75	15·25	8·00	...	...	8·4	...	18	2·06	1·95
68·3	·692	7·4	2·3	77·0	469·9	2·25	4·00	7·00	7·75	8·00	...	...	7·2	...	13	6·82	6·72
60·2	·523	5·7	3·7	60·0	473·6	13·25	15·00	0·00	0·75	1·00	...	...	2·7	...	0	0·00	0·00
58·6	·493	5·3	4·0	56·9	473·4	3·50	22·50	4·50	0·50	0·00	...	...	1·7	...	0	0·00	0·00
64·4	·614	6·6	3·6	66·7	469·4	37·50	71·75	38·25	128·50	34·00	...	...	5·4	...	105	43·32	...

* 5·00 days not taken. † 25 feet above the ground.

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